JANUARY, 1928

Railway Engineering and Maintenance

CONTENTS

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294

Railway Engineering and Maintenance

Formerly the Railway Maintenance Engineer

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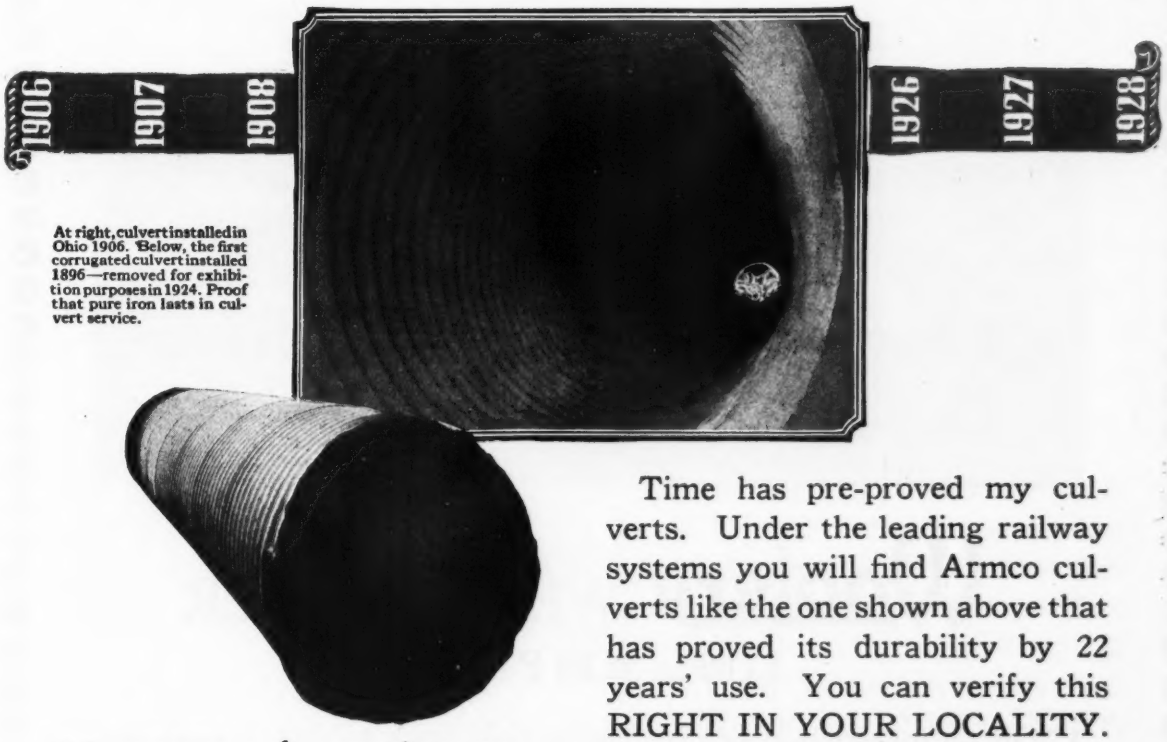

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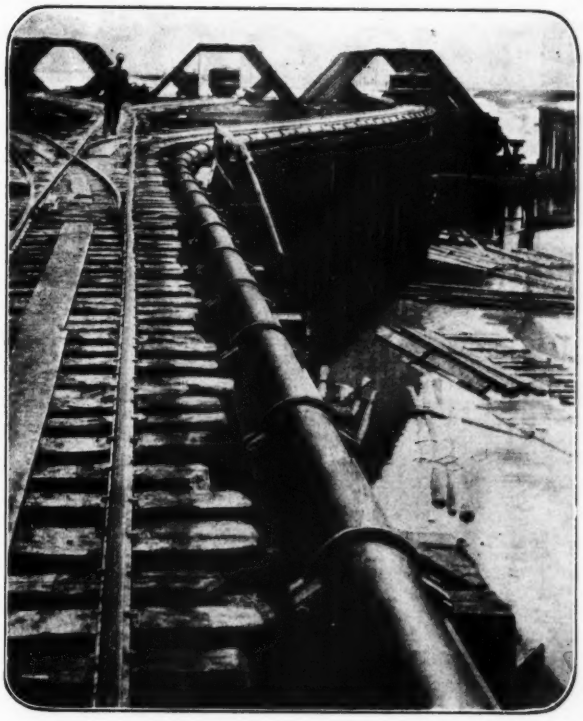

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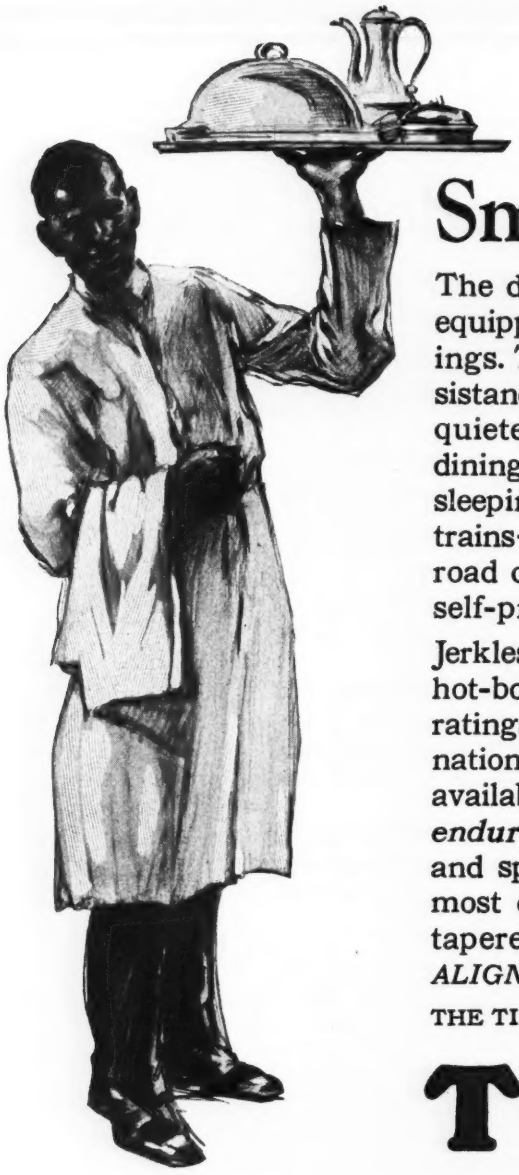

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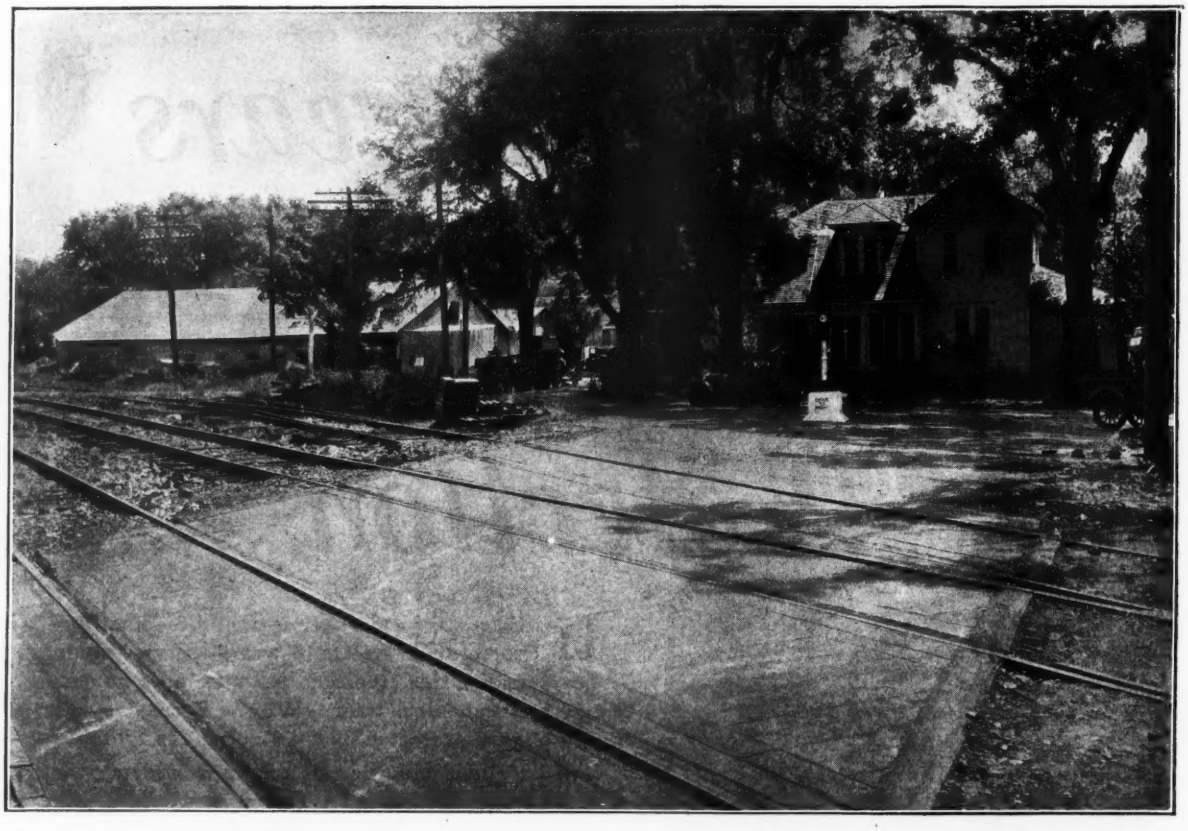

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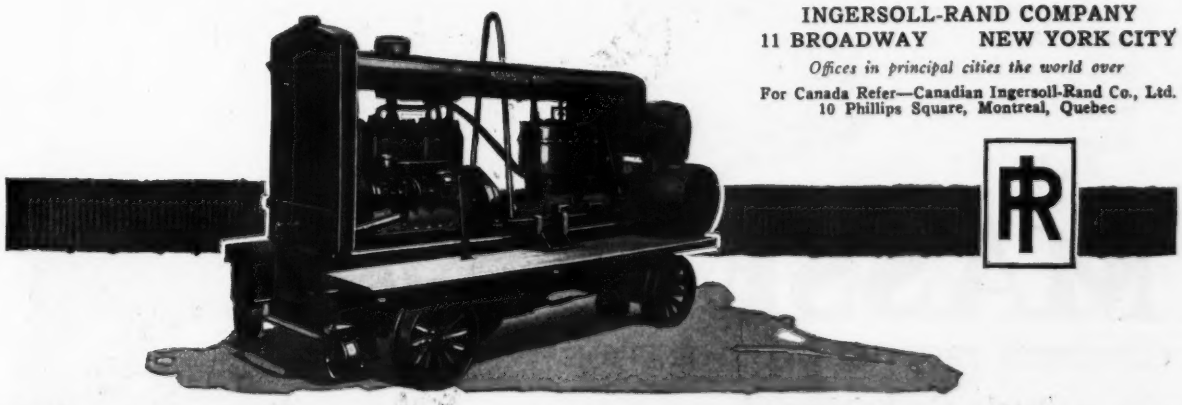

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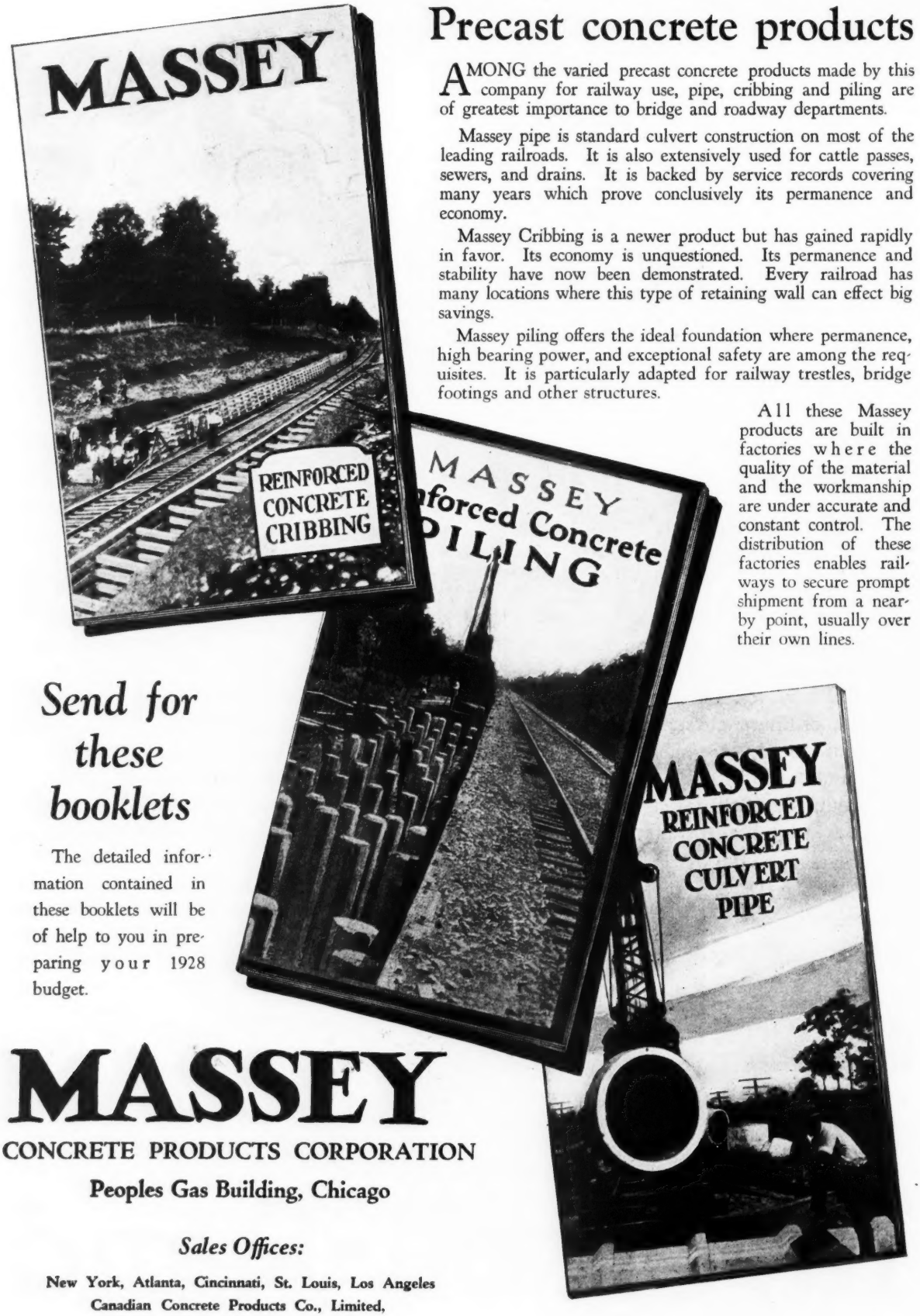

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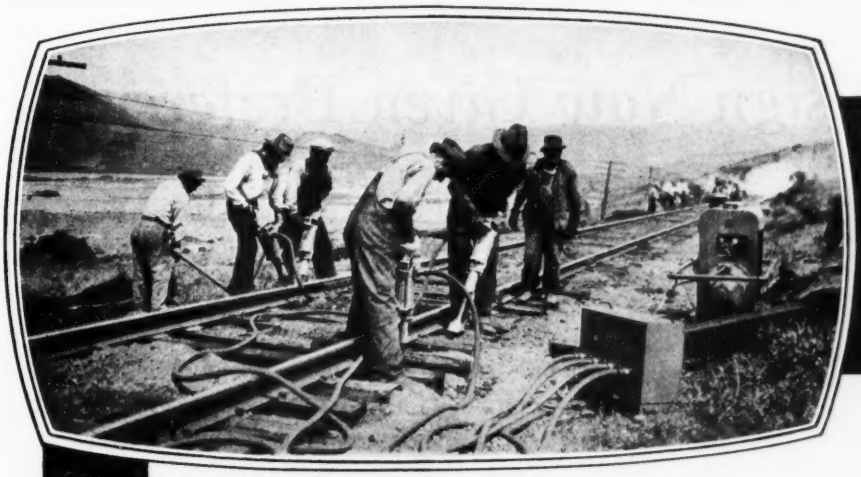

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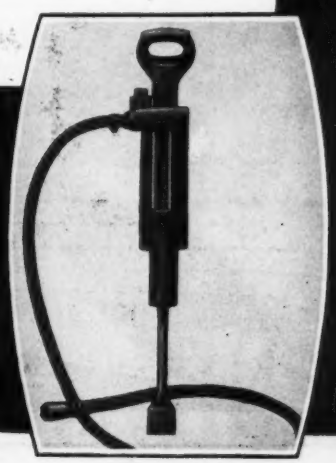

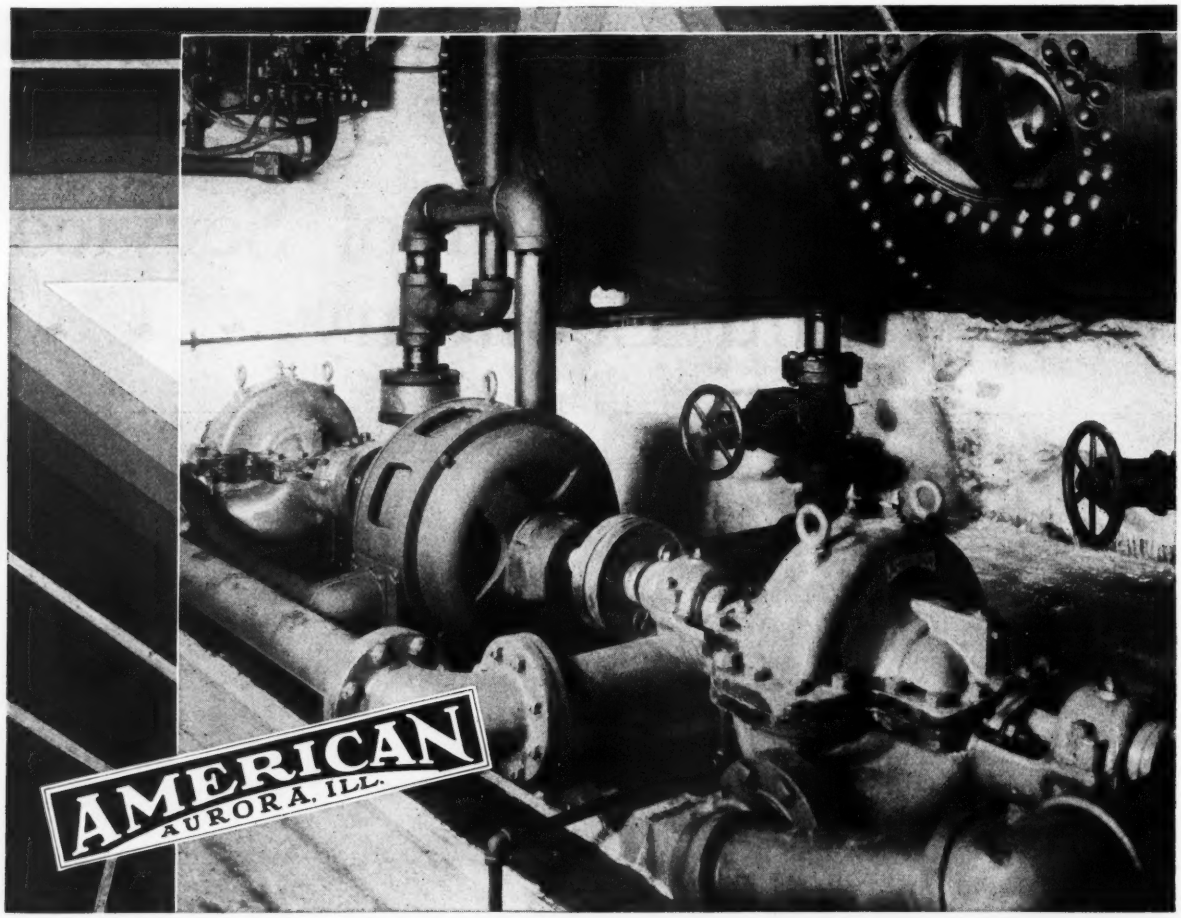

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THE WOOD ETERNAL

Railway Engineering and Maintenance

Volume 24 January, 1928 Number 1

1927 a Roadway Year—1928 Equally Promising

THE year 1927 was one of outstanding achievement for the engineering and maintenance of way departments. While the mileage of new lines and of second track completed fell considerably below similar figures for 1926, the expenditures for the enlargement and improvement of the facilities as well as for their current upkeep equaled, and probably exceeded those of any previous year while, because of the generally favorable working conditions, the actual amount of work done was still greater. As a result the year ended with the fixed properties in better condition to meet the demands of traffic than ever before.

The Operating Performance

To the continuation of this program of constructive improvement of the roadway and structures is due the credit in no small part for the high standard of transportation service rendered by the railways during the year. The practically complete absence of congestion, with resulting delays, in the face of a record-breaking traffic during the early months of the year, resulted primarily from the completion of a wide variety of improvements, large and small. The strengthening of the track and structures also resulted in increasing the capacity of the railways and particularly in improving the regularity of service by reducing delays due to derailments, slow orders, etc.

These improvements have also contributed materially to increased train loading and more particularly to the higher and more uniform speed of trains, the miles made per car per day reaching new high records of 30.7 for the first ten months of the year and for a single month, of 34.7, in October. Average train loadings exceeded those of the same month in the previous year in seven of the first ten months of 1927, while for the entire period the average train load of 785 tons compared with 773 tons in the same months of 1926, and 746 in the same period of 1925. Net ton miles per train hour broke all records when the figure for a single month was raised from 9,865, reached in August, 1926, to 9,967 in September, 1927. The average for the first ten months of 1927 was 9,652 compared with 9,254 for the same period of the previous year. Freight train speeds during the first ten months of 1927 maintained a monthly average of 12.3 miles or 0.3 of a mile above 1926 and 0.5 of a mile above 1925.

The year opened with traffic moving in record breaking volume, that handled in the first three months of 1927 exceeding the record established in the same period of the previous year by five per cent. As the spring advanced, however, traffic failed to show the customary increase and since May ran behind the volume of a year ago, with the result that by October 1, the cumulative total for the year showed a slight decline. Since that date the comparison with 1926 has been still more unfavorable, largely because of the abnormally heavy traffic handled during the closing months of a year ago. The net ton miles for the year approximated 478,000,000,000 or 2.3 per cent less than in 1926, although still 4.6 per cent above 1925. Revenue car loadings for 1927 are estimated at approximately 51,500,000 as compared with 53,260,000 during the previous year. There were 28 million-car weeks in 1927 with the highest weekly loading during the week ending October 25, when 1,128,486 cars were loaded. This compares with the high record week for all time (ending November 31, 1926), when 1,216,432 cars were loaded.

The Improvement Program

Ever since the railways were returned to their owners at the termination of federal control in 1920 their managements have been active in improving their facilities. The year that has just closed witnessed a continuation of this policy, insofar as capital expenditure for roadway is concerned. The magnitude of the programs is reflected by statistics compiled by the Bureau of Railway Economics for the Class I roads of the United States for the first nine months of 1927. In this period capital expenditures for all purposes, including equipment, aggregated $570,215,000, a decrease of $58,878,000 as compared with the same period of 1926. This decline was confined entirely to equipment, however, for the amounts spent for roadway improvements showed an increase of $7,153,000 or two per cent. Furthermore, this study showed that 64 per cent of the total expenditures went for roadway improvements as compared with 57 per cent in 1926. Although there was some slackening in the rate with which new improvement work was authorized during the closing months of the year, due to the lack of pressing necessity for added facilities by reason of the decline in traffic, there was no suspension of the large volume of work already authorized, with the result that the total capital expenditures for roadway improvements for the year, when available, are expected to equal and probably exceed the record established in 1926.

In contrast with the magnitude of these expenditures, the mileage of new lines completed in the United States during the year aggregated only 779

as compared with 1,005 in 1926 while the mileage of second and other main tracks decreased to 445 as compared with 473 in 1926. In Canada 310 miles of new lines were completed during the year, a decrease of 30 miles as compared with 1926, while 30 miles were built in Mexico.

As indicated above the largest part of the money allotted for improvements last year went for miscellaneous purposes rather than for additional main track. As the roads handled without a trace of congestion the abnormally heavy traffic in the closing months of 1926 and the early months of 1927, it is evident that they have largely overcome the shortage of facilities that confronted them when they emerged from federal control in 1920. As a result, their improvement programs are reflecting more and more, projects which are justified by the economies they will produce, rather than by the congestion they will eliminate.

Equipment

The fact that 1927 was another roadway year is borne out in a striking manner by a study of equipment ordered and built. The number of locomotives ordered during the year totaled 734 in contrast with 1,301 in 1926, being the lowest with two exceptions in the last 27 years. The number of locomotives built during 1927 for domestic service, including Canada, totaled 1,009 as compared with 1,585 in the previous year. A total of 1,612 passenger cars were ordered during the year as compared with 1,868 in 1926, the smallest number in any year since 1921. The number of passenger cars actually built last year for use in the United States was 1,785 as compared with 2,184 in the previous year. The total number of freight cars ordered in the United States during 1927 aggregated 72,006, an increase as compared with 67,029 in 1926, while 63,390 freight cars were delivered in the last year as compared with 88,862 in the previous year. A total of 180 internal combustion engines, rail motor cars and trailers were built in 1927 as compared with 142 in 1926, while the roads also ordered a total of 132 new motor coaches and 82 new motor vehicles of other types.

Maintenance Expenditures

Like capital expenditures, the amounts spent for roadway maintenance also reached a new high level in 1927. Particularly in the early months of the year, work was prosecuted with unusual vigor with the result that at the end of May the expenditures exceeded those for the same period of the previous year to the amount of $9,612,499 or 2.9 per cent. Since that time there has been a slight slackening of progress with the result that expenditures for the ten months ending with October showed an increase of only $3,450,000 or 0.6 per cent. It is, therefore, probable that the entire year will show expenditures for maintenance approximately equal to those of 1926. In other words, while the distribution of the work throughout the year has varied from that of 1926, it will approximate the high total reached that year.

From the standpoint of weather conditions work was prosecuted under handicap during a large part of the last season. Particularly during the early part of the year, work was delayed seriously by unusually prolonged wet weather although this was largely offset by an unusually favorable autumn. The outstanding feature of the year was the flood in the lower Mississippi River valley in June, followed by a smaller but more violent flood in New England late in the fall. The far-reaching effects of the former flood are shown by the fact that the loss in railway property alone is placed by recent estimates as approximately $10,000,000.

Labor Supply

The past year has been one of adequate and stable labor supply. Such shortages as existed were local and of short duration. In most areas a surplus existed throughout the season, a condition that tended to stabilize forces. There was an almost complete absence of unrest or agitation. The wages of foremen were increased on a number of roads. The one important disagreement that went to arbitration resulted in a decree establishing a graduated wage scale based on length of service, thereby putting into effect an idea frequently suggested but not employed on any large scale previously.

While the stabilizing of forces by the transference to the winter months of more work, such as the relaying of rail, is receiving increasing consideration and is being adopted experimentally or as standard practice on more roads each year, the fluctuations in track forces have shown no tendency to decrease of late. Thus, in 1927, the number of maintenance of way employees varied from a minimum of 351,591 in January to 487,439 in July, a spread of 135,838 men. This compares with a spread of 126,155 men in 1926, 101,839 in 1925 and 93,468 in 1924. In other words, the roads have increased the number of their temporary seasonal maintenance of way employees by more than 40,000, or nearly 50 per cent in three years. This has resulted primarily from increasing the summer forces rather than by reducing the number of men employed during the winter. In the height of the working season last summer the total number of maintenance of way employees reached the high total of 487,429 men.

Rails

The year has been characterized by the continuance in more active form of the trend toward the use of rails of heavier section. While data regarding the weights of the rails rolled in 1927 are not yet available, it is known that the percentage of rails weighing 100 lb. per yard or over was larger than in 1926 when the proportion of these rails to the total was 61.2 per cent. This, in turn, compares with 58.8 per cent in 1925, 49 per cent in 1924 and 26.9 per cent in 1916. Furthermore, increasing interest is being shown in sections heavier than any yet rolled, one prominent eastern road now having under consideration designs of 150-lb. sections. The trend towards the use of heavier rails is also reflected in part by the summary of capital expenditures made by the Bureau of Railway Economics for the first nine months of 1927, already referred to, wherein it was shown that the capital expenditures for heavier rail in this period aggregated $35,199,000 as compared with $29,531,000 in the same period of the previous year.

From the standpoint of technical research the outstanding development of the year has been the completion of a machine for the detection of transverse fissures in track. This machine, which has been developed in co-operation with the American Railway Association and under the direction of the Rail Committee of the American Railway Engineering Association, is designed to detect the presence of

transverse fissures in rails in track, and to indicate their relative size. While this device does not strike at the elimination of the cause of these injurious flaws in rails, it does indicate their presence, if the laboratory tests with this equipment are confirmed in the field, thereby permitting rails containing these defects to be removed from the track before accidents occur. This device holds promise of being the most important development in the field of track construction since the discovery of the transverse fissure itself in 1911.

Timber Preservation

The railways have been the pioneers in the development of the science of timber preservation in this country and have always been the largest users of treated wood, primarily for cross ties. As a result more than 65 per cent of all of the ties inserted in track are now treated and this percentage is increasing slowly but steadily, as the economy of this practice becomes more universally recognized, particularly on the smaller roads which have been held back by the increased initial cost of treated ties. Railway engineers are awakening also to the possibilities of the more general treatment of bridge timbers as it is being demonstrated that it is practical to frame these timbers for the majority of structures with sufficient accuracy to cause relatively little mutilation in the field. This practice which is, as yet, in the early stages of its development, made appreciable progress during the year.

The Outlook for 1928

Although the progress made during 1927 has been noteworthy, the outlook for a large program during 1928 is equally encouraging. While the year closed with traffic about 10 per cent below that of a year ago, railway and industrial executives are almost unanimous in anticipating that it will come back early in the new year and will be again at a record level before mid-summer. Indicative of their confidence in this outlook are the large car orders placed and the inquiries issued during the closing weeks of December, aggregating more than 21,000 freight cars.

Even more indicative is information published by the Railway Age in its annual statistical number of January 7, based on the budgets of roads with an aggregate mileage of 80,000, forecasting that the capital expenditures of the roads of the United States and Canada will approximate $750,000,000 or only slightly below the amount actually spent in 1927. Furthermore, a larger mileage of new lines was under construction at the end of the year than was completed during the year in both the United States and Canada, approximately 900 miles of new lines being carried over for completion in 1928 in the United States and 640 miles were under construction or contract in Canada at the end of the year.

As for maintenance, a comparison of the orders placed for rails by roads for the total requirements show that the tonnage now on order exceeds that placed by the same road last year by one per cent, excluding 100,000 tons ordered optional by the Pennsylvania in addition to definite orders for 200,000 tons. With the traffic outlook prevailing at present and with the attitude already shown by the railways towards expenditures, the indications point to 1928 as another active year for the engineering and maintenance of way departments.

What Our Readers Think

E. O. Faulkner

Topeka, Kan.

TO THE EDITOR:

In view of the passing on December 17 of E. O. Faulkner, it has occurred to me that it may not be amiss to recall the pioneer work that he did in the development of some of the practices for the preservation of timber which we now regard as standard, particularly relative to the introduction of the Rueping process. It so happens that some of the early experiences with this process were described by Mr. Faulkner himself in a letter which he wrote me as recently as last July, from which I quote as follows:

"In the early part of 1904 I got hold of a circular issued by Hulsberg & Co., of Charlottenberg, Germany, describing the Rueping treatment, and entered into correspondence with them, stating that if they could do what the circular stated, namely, completely impregnate the sap wood of any tie with 3½ to 4 lb. of cresote per cu. ft., we might be induced to do business with them, but a test must be made in America. As a result, they sent a Mr. Grumbacher over for the purpose and we forwarded loblolly ties to Perth Amboy, N. J., where a test of the process was made and proved entirely satisfactory. This test, however, was in a small experimental plant, taking one tie at a time, and I told Mr. Grumbacher if he would come to Somerville and treat Rueping ties in our plant on a commercial scale we would turn it over to him. He did this, but made a mess of the work, not being able to control his air pressures. I still kept after it by correspondence, because I was satisfied the process was all right in the abstract, although I did not care to make a recommendation to our people for an entire change in our methods because of a few individual ties treated in a test plant where so-called experts were watching every move; I wanted it done by cylinder load in the hands of men who would later have to operate the process if we went into it.

"In the fall of 1904 they sent B. Kuckuck over from Germany and about November of that year he treated very successfully several thousand ties on a basis of between 4 and 4½ lb. per cu. ft. As a result, I recommended that we make a contract with them and erect a new plant in Somerville to operate with the process, which was done, Mr. Kuckuck remaining during the winter to supervise the design.

"We held several hundred of these ties in the plant for weighing and examination purposes, and sent the others out on the road, distributing them among several divisions so that they could be watched, because they were actually the first Rueping ties treated in America, or in fact anywhere else, as the process had not been used anywhere up to that time.

"After this bunch of ties was treated no more were treated by the Rueping process until we got into the new plant in March, 1906.

"The whole circumstances come back to my mind. There was an agitation at the time for dropping zinc chloride and using creosote for tie treating, but without some process whereby we could thoroughly impregnate the sap wood with a nominal quantity of creosote, the expense of creosoting was out of the question; this Rueping process seemed to meet the conditions in every way, and experience has proven that fact.

"I am not quite sure about the kind of creosote used but think they were treated with some that we got from Holland in barrels. We were using creosote at that time from Cape Breton which contained a large amount of naphthaline. I was not in favor of going into a "cell wall" treatment with a creosote which contained such a large proportion of naphthaline on account of the heavy evaporation; nor could we afford to take it in barrels because so many were broken in transit. We, therefore, induced Carlos Lembcke to take a contract for supplying German creosote and delivering it by tank steamer at Galveston, which was done in the steamer "Pectan," the first tanker bringing creosote to America." R. S. BELCHER,

Manager Treating Plants, Atchison, Topeka & Santa Fe.

String Lining of Curves Made Easy*

A Method of Correcting Alinement Which Is Quicker and More Convenient Than Use of Engineering Instruments

By CHARLES H. BARTLETT

This is the first of a series of articles describing a new method for relining curves by means of a string in place of a transit. In view of the increasing importance of accurate curve maintenance and the necessity for checking curve alinement frequently, it is believed that this method will be of interest and help to division engineers, roadmasters and foremen. It has been adopted by a large western road after extensive trial and is employed in the maintenance of several thousand miles of this line. Each article will be complete in its description of the particular portion of the method, while the series as a whole will constitute a manual of instruction to which anyone using the method may refer as much as he finds necessary. The author developed this system when an instrumentman in the office of the division roadmaster of the St. Louis division of the Illinois Central.—EDITOR.

IT is a well known fact that all railroad curves are made up of circular curves and easements or spirals. The circular curves are staked out by engineers before the track is built; while the easements are more usually installed after the curve is laid. The above statement is especially true of curves which were laid out many years ago, when the use of an easement curve was considered an unnecessary refinement of engineering. It is an equally well known fact that no curve, no matter how well it may be ballasted or how carefully it may be maintained, will remain as it was originally staked out. This change, due to many different forces (such as temperature changes, continual pounding by passing trains, shifting of the roadbed, etc.), produces what are known as "sharp" and "flat" spots in the original curve. By a sharp spot is meant a portion of the curve whose curvature is greater or "sharper" than that of neighboring portions of the curve, or, less commonly, than the curvature as first staked out. Similarly, a flat spot is one whose curvature is less than that of the adjacent portions of the same curve. It is obvious that such a condition is not desirable, and equally obvious that the sooner it is corrected, the less discomfort will be caused to passengers and the safer the track will be for all trains, passenger and freight. It is the purpose of string lining to correct the defects of alinement and to give to the curve that uniformity which insures both good riding qualities and safety, restoring the curve to its original shape or nearly so.

Although string lining, in one form or another, has been in use on some of the railroads of this country for many years, its use has not been widespread and many roads have preferred to leave the work of realigning curves to the engineering department, or else entirely to the track foremen, each of whom has had his individual way of accomplishing the work.

This practice has resulted in a condition found on almost every road in the country, whereby on one section all curves will be well lined and properly elevated, while on the next section they will be just the opposite—the reason, of course, being the difference in the ability of the two section foremen to line their curves. Such a condition could be remedied quite easily if a standard procedure for curve lining could be adopted. Naturally it follows that any system adopted as standard must be easily learned and easily remembered by all foremen and supervisors; and, moreover, that such a system must reduce to a minimum not only the time required for calculations, but also the effect of judgment or experience. In other words, it must be nearly "mechanical" in its application. It is claimed for the system described in this series of articles that it possesses to a high degree all these qualifications. The proof will, of course, rest in the application of the principles of actual conditions.

It should be pointed out at this place that this system is not that commonly known as "cording a curve." The latter method consists of measuring the middle ordinates to a curve from a cord stretched between points on the curve, averaging what appears to be the predominating ordinate, and then throwing the track, by means of lining bars or similar devices,

back and forth until it is approximately uniform. While this method will undoubtedly work, after a fashion, any foreman who has ever tried it knows that he will have to go over the curve several times before a satisfactory result can be obtained, and the labor required and the time involved must surely have struck him as so much wasted effort. Such a man will readily concede that if the proper throw could be made the first time much needless work would be saved. The proposed method points out exactly what correction is needed at each point in order to make a true curve.

Another point which should be emphasized here is that no elaborate equipment is necessary. No piano wire and no delicate measuring instruments are required. All that is needed is a good stout piece of cord, similar to that used by bricklayers or masons, and an ordinary ruler whose divisions start at the end of the rule in order to allow it to be placed against the gage line of the high rail, as explained later. Moreover, there are no complicated mathematical expressions to use, as the process consists in the addition and subtraction of small numbers representing the middle ordinates as measured. Frequent checks on the work can be made, as explained later, so that if a mistake is made it will be detected quickly, before the work has gone too far.

Finally, the system *works*. This has been demonstrated in actual practice by re-alining nearly a thousand curves by its use. And it works, not only from the standpoint of the maintenance man, by giving him better track in less time and with less expenditure of labor and money, but also from the standpoint of the engineer, inasmuch as by its use can be determined all the properties of a curve which can be ascertained by using an instrument. That is, the central angle between tangents, the central angles of all spirals, the points of spiral, points of curve, degree of curvature, rate of change of curvature of spiral, etc.—all can be computed readily and easily within satisfactory limits of error. When to this fact are added the many other advantages—such as the fact that the system is from five to ten times as rapid as transit lining, the engineer as well as the foreman will realize that it will pay him to investigate the possibilities of this method of string lining.

The Method Is Rapid

The time required to master the fundamental principles of the entire method varies from two or three hours to about eight or nine hours. One day's working time has always been found sufficient to enable a new man to obtain a thorough understanding of all the rules and necessary operations.

The various operations in setting stakes for a curve, such as taking the original data, figuring the curve, and setting the stakes, have all been carefully timed. It takes, on an average, about ¼ minute per station to take the original ordinates of a curve. This is an average figure, and takes into account delays due to waiting for trains to pass, walking between stations, rechecking any doubtful ordinates, and finding the point of ending and beginning of the curve (by trial method to be outlined).

It takes, on an average, about 1½ minutes to distribute stakes at each string lining station (from the original bundles), drive an iron pin into rock ballast, shake the pin to make a good hole, drive a wooden stake, and set the tack in the stake. In cinder ballast the average time per stake set in the field is about 1 to 1¼ minutes, depending upon the firmness and density of the ballast. This makes the total time required to perform all the field operations in lining a curve equal to about 1¾ minutes per stake in rock ballast, and 1¼ to 1½ minutes per stake in cinder ballast.

Several Trials Are Required

It is obvious that in attempting to line a curve which is badly out of shape, several trials will be required before the best curve can be found. If a foreman and his gang of men set out to reline a curve by eye only, several attempts will be required before a satisfactory curve can be obtained; and the same is true of the computations required by the system described in this series of articles, the only difference being that instead of the actual track on the curve being changed, only the figures representing the curve are changed. It has been found, consequently, that an ordinary school slate, ruled into columns (as described later), furnishes the easiest and most satisfactory way of making the changes required, inasmuch as it requires more time to make erasures from a sheet of paper. The length of time required to make the computations on the slate will, of course, depend upon the individual and upon the number of curves he has lined. Curves requiring no more than a foot throw either in or out, can ordinarily be lined upon a slate at the rate of from 1 to 2 stations a minute. The author has lined (on the slate) curves of 86 to 90 rails in 20 and 30 min. time, whereas some harder and shorter curves which were badly out of line have taken as much as three or four hours, in order to obtain a curve which would not throw beyond a certain fixed limit. The figure of 1 to 2 stations a minute includes the entire time required to line the curve on the slate, from the time of starting until the curve is fully lined; it includes making all changes, erasures, etc.

Thus, according to the above average figures, a curve in rock ballast, a mile long, would require about seven hours to re-line, from the time of starting in to get the original data until the last stake was set. As a matter of record, several curves a mile long have been lined by this method at the rate of six hours per mile. All of these curves were compound curves (before lining), and were spiraled. In relining them by the string system, proper spirals were placed at each end and between the branches of the compounds. The author's experience in lining curves with a transit has led him to believe that the time it would require to line a compound curve (with two branches), spiral both ends and insert a spiral between the branches of the compound, and drive a stake every 33 ft. in rock ballast, would be anywhere from three to five working days of eight hours each. On such a curve (a mile long), the intersection angle could not be run, in all probability, and the matter of lining an entire mile without "running off the embankment" would be quite a problem.

In addition to the fact that a curve can be figured and the stakes set much more quickly by the string lining method than by the transit method, there are other advantages which make for a considerable saving in time. For example, passing trains and motor cars do not cause any serious loss of time. With an instrument, every time a train or motor car goes by, a new set-up must be made, which takes from three to eight or ten minutes, depending upon how far the flagman has to go for a second backsight. With the string lining method, the only time lost is that which it takes the train or motor car to pass

the working point. This is an advantage of considerable weight on heavy traffic lines.

String lining is cheaper than transit lining because of the time saved, because fewer mistakes are made, because a better curve is obtained, and because the throws are kept to a minimum. In transit lining, a party must necessarily consist of an instrumentman, a rodman and a chainman. The combined salaries of these men will equal about two to three times that of a chainman and two section laborers for the same length of time. Adding to this fact the saving in time effected, we have, considering string lining as say four times as rapid as transit lining, the cost in engineering labor to use the string method as approximately one-eighth of that with the transit method. These figures, if anything, are conservative. The actual saving will run as high as 9/10 in most cases. Not only are the salaries of the instrumentman and rodman saved on each curve, but these two men are then available for other work in the engineering department.

Facilitates Compounding

Further, string lining permits compounding a revised curve slightly for a given distance, usually quite short, in such a manner that the saving in throw effected is marked. This is a valuable property for the maintenance man, since it enables him to install a smooth-riding curve with a minimum of throw, and consequently, with a minimum of time and labor. The time of a section gang can be cut down by several hours in this way, thus realizing a big saving. Suppose that at string lining station number 10 of a curve, we change a revised ordinate by 1 (tenth of an inch) in order to decrease the throws, then, as will be explained later, at the end at some such station as 67, say, we have effected a saving in throw of twice 67-10 or 114 tenths of an inch (11.4 in.); yet we have compounded the curve only 5¼ minutes and for a length of only one rail. It would never have occurred to an instrumentman with a transit to make such a compound, and he would have carried his curve through to the end, with the consequent big throws. String lining, then, permits of keeping the track close on the old bed (a big advantage) and yet obtaining a smooth-riding curve.

By making it easier for the trackman to line his curve (by placing the stakes every 33 ft. instead of every 50 or 100 ft.), we avoid the small sharp and flat spots which creep in because of the fact that a foreman has to line between the 100 ft. transit stakes by his eye. We accordingly prevent the curve from getting so quickly into bad line once more, and thus effect another saving in maintenance cost.

Work Can Be Inspected in Advance

Since a record of the throws required at each joint or string lining station to line a curve into a new and better shape is obtained from the slate or calculation paper, the operator has a record, in black and white, of how much he proposes to throw the curve. He can take this record to the roadmaster or assistant engineer, as the case may be, to look over at his leisure and inspect the changes necessary.

If the work were to be done with a transit, the instrumentman would first have to set spikes or stakes, and then go to every transit station and measure the throw, if such a record were to be given his superior officers before the curve was actually lined in the field. The advantage of having such a record as string lining gives is readily understood by anyone who handles such matters on a railroad. The size of the gang required to do the work of lining, the approximate amount of time required to do the work, and all other arrangements or information relative to the task of re-alining the curve are known and determined before a start is made.

String lining permits of so compounding a curve (if necessary, of course) that the throws at or near a permanent track structure can be made either zero or negligible. This also is a means of avoiding a great deal of unnecessary work and of saving time and expense. Such small throws as are required can be made upon the slate, so that the entire amount of shifting of such obstacles can be seen by the man in charge of moving them before the curve is lined. To do this with a transit would require a great deal of time and the running in of many trial curves before a final curve is selected.

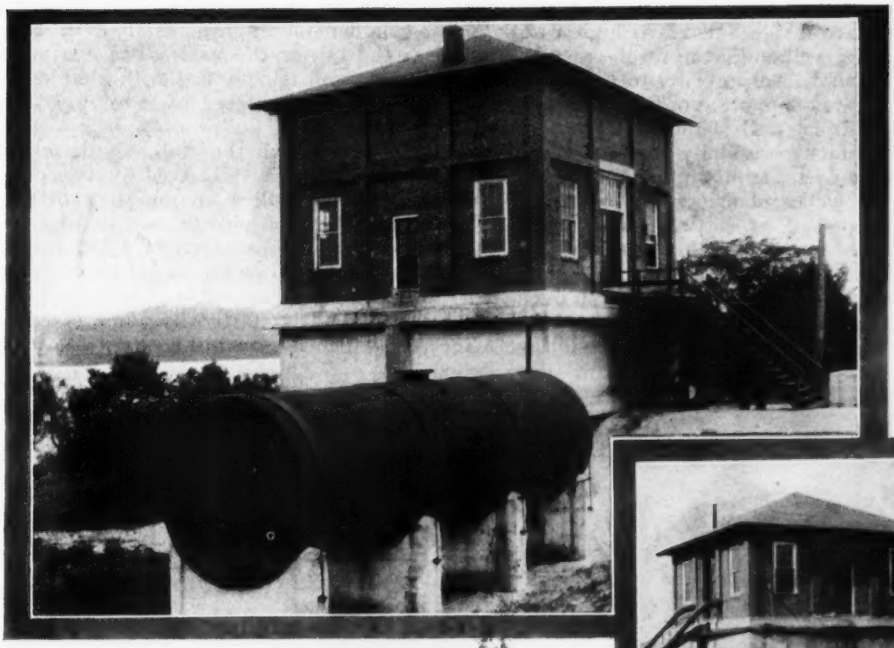
The equipment necessary to do string lining is much simpler and much cheaper than that required with a transit. In addition to this, it is easier to carry around, no care need be felt for its safety or adjustment; and, finally, expensive errors in instrument work done by more or less inexperienced men are entirely avoided.

Summary

The principal advantages of string lining, then, are as follows:

(1) It is much cheaper than any other method.
(2) It is much quicker than any other method.
(3) It is much easier than any other method.
(4) It is easily learned, easily remembered, and easy to use.
(5) Errors are readily detected by several checks on the work.
(6) Throws can be governed almost at will.
(7) Spirals are no longer an "affliction" to install, but are so easy, and help to decrease the throws required to line a curve by so great an amount that their installation becomes easy and automatic.
(8) A record of proposed changes or throws is obtained and is ready for inspection before any work is done.
(9) It lowers maintenance costs.
(10) It permits of relining curves annually at small expense of time and labor.
(11) It gives a more satisfactory curve.
(12) No expensive or easily breakable equipment is required.
(13) Less men are needed to do the work of figuring the curve.

Modern Installation of a Flashing-Light Highway Crossing Signal

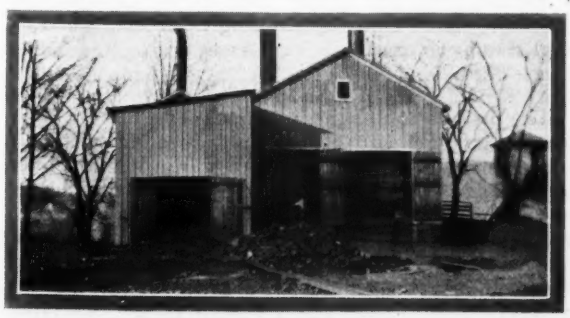


The Rebuilt Pump House and Oil Storage Tank. Below — The House Before Alterations

Better Pumps Cut Operating Costs

THE importance of an adequate and dependable water supply of suitable quality for use in yard and road engines at the Stevens, Ky., terminal of the Chesapeake & Ohio, led to reconstruction of the water station at that point and the installation of more satisfactory pumping equipment, as well as a settling tank of greater capacity. The plan followed in making this improvement is not only suggestive of the opportunities for improvements of this character for the purpose of supplying a greater quantity of water, but is also illustrative of the benefits which may be derived in the way of greater dependability and reduced cost of operation and maintenance by the replacement of old equipment with facilities of a more efficient character.

The Stevens terminal is located parallel to and close to the south bank of the Ohio river, a few miles east of Cincinnati, Ohio. Prior to the completion of the present improvement the engine terminal was served by two pumping plants taking water from the river. Due to a fluctuating river stage over a range of 65 ft., special provision was necessary to take care of pumping equipment. The older of these plants was located on the sloping river bank just north of the roundhouse and consisted of a series of nine independent steam pumps placed at various elevations on the slope of the bank. The lowest pump was used when the stage of water in the river was low, recourse being had to pumps higher up as rising waters submerged those lower down. Steam was supplied from a battery of three boilers at the top of the bank, coal for which was unloaded from the westbound main track and hauled about 150 ft.



Boiler House for the Old Pumps on the River Bank

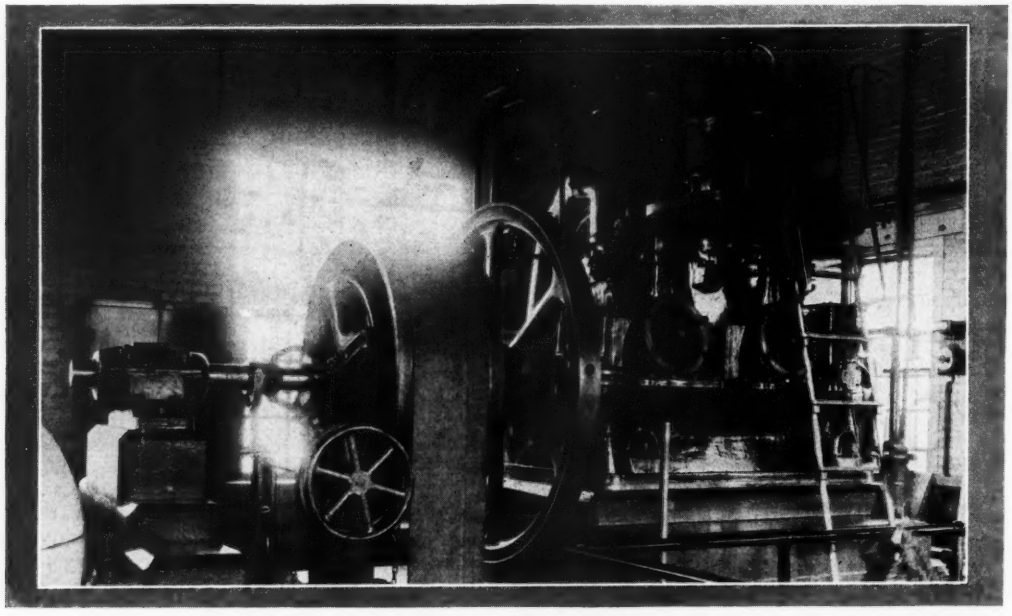
A Second Plant Found Necessary

The inefficiency and inadequacy of this plant, combined with heavy maintenance trouble and interruptions due to occasioned heavy flows of sand in the river, made it necessary to construct a second pumping station which was located between the westbound main track and the river about 6,550 ft., west of the engine terminal, the old plant being retained for stand-by service. In the newer plant the problem of meeting the wide variation in river stages was solved in a more satisfactory manner. A concrete pump well of 20-ft. inside diameter and 58-ft. 6-in. depth was constructed with the bottom about 7½ ft. above low water level in the river. From this well a pipe tunnel 6 ft. high by 6 ft. wide at the bottom and 4 ft. wide at the top, was extended through the river bank a distance of 227 ft., for the purpose of housing two 16-in. cast iron suction lines which terminated in the river behind an old dike jetty about

65 ft. beyond the outer end of the tunnel. A brick pumphouse 28 ft. square inside and 12 ft. high was built over the top of the well and, as the well extends about 20 ft. above ground level in order to be above high water, the house was supported on a foundation built around the cylindrical wall of the well.

The pumping equipment originally installed consisted of two 12-in. by 14-in. triplex pumps installed in the bottom of the well and driven by means of long steel shafts supported by heavy iron bracing from well heads located in the pumphouse above and operated by two 125-hp. motors.

The discharge line from these pumps came up over the top of the well and connected with a 14-in. cast iron pipe line leading to the engine terminal facilities with an 8-in. line extending westward to a small treating plant located at the west end of the yard for the treatment of water delivered to locomotives at that point.



The New Oil Engine

The Plant Proved Unsatisfactory

This pumping plant had proved unsatisfactory. The operating costs were high and it was frequently necessary to shut down both units to repair damage caused by sand in the pump cylinders and valve chambers. As a consequence it was often necessary to operate the old steam pumping plant to insure an adequate supply of water. The two 16-in. cast iron suction lines were also giving unsatisfactory service. Because of these difficulties, which had resulted in several complaints of water shortage at the busy engine terminal, it was decided to replace the triplex pumps with centrifugal pumping equipment and make such changes in the pumphouse and auxiliary facilities as were necessary to provide a thoroughly efficient and reliable plant.

The new pumping equipment consists of two eight-inch single-stage, horizontal, split-case centrifugal pumps with cast iron impellers, installed in the bottom of the well. One of these is driven by a direct-connected, 125-hp. induction motor, operating at 1,750 r.p.m., on 60-cycle, 3-phase, 440-volt alternating current. The other is belt-driven from a 120-hp., type "Y," 2-cylinder oil engine installed in the pumphouse at the top of the well. The engine operates at 257 r.p.m., and is equipped with a 60-in. by 22-in. pulley, which is connected by a six-ply, 16-in. belt to a 24-in. by 16-in. pulley on a jack shaft located about half way down the well. A 34-in. by 14-in. pulley on this shaft is connected by a second belt to a 13-in. by 14-in. pulley on the shaft of the pump. This arrangement of pulleys and belting gives the pump a speed of approximately 1,750 r.p.m. As a consequence the two pumps could be made duplicate with all parts interchangeable.

The oil engine is started by compressed air from a receiver which is replenished by a 3¾-in. by 4-in. air compressor, driven by a 3-hp. gasoline engine, after starting the engine igniter by the heat of compression. The clutch between the engine shaft and belt pulley is equipped with a shifter which may be operated either from the pumphouse floor or from the bottom of the well.

An oil storage tank is to be seen in the foreground of the photograph showing the exterior of the pumphouse. This has a capacity of 10,000 gal., and is set low enough to be filled by gravity from a tank car spotted on the adjacent track. From this main storage tank the oil is forced by a small rotary pump into a 500-gal. auxiliary supply tank at the pumphouse. Distillate oil of a quality ranging between 35 and 39 deg. Baume is used.

Piping Entirely Rearranged

The installation of the new pumps required a complete rearrangement of the piping in addition to the replacement of the old 16-in. cast iron suction lines by new 12-in. wrought iron pipe. All of the old 16-in. pipe was removed, except one joint and one 16-in. valve in each line, which were imbedded in the concrete wall of the well, where the lines extended from the well into the tunnel. To avoid disturbing the concrete, these valves and a portion of the two pipes were left in place and the 12-in. pipes were passed

through them, being caulked in place with lead to provide a water tight joint. All piping in the well is 12-in. and is so arranged and equipped with valves that the pumps may be operated either singly, in series, or in parallel, or with either of the pumps or with both of them taking water from either suction line, or with each pump drawing water from the nearest suction line independently. Either suction line may be backwashed by operating the opposite pump. The discharge line was run through the side of the well below the ground level instead of over the top, in order to take advantage of soil covering to prevent freezing.

The well is also equipped with a 4-in. by 6-in. McGowan duplex bilge pump with a 3-in. suction and a 2-in. discharge line, driven by a 5-hp. induction motor. The primary purpose of this pump is to serve as a primer for the two centrifugal pumps when necessary, but it is also piped to remove any seepage water which might accumulate in the sump at the bottom of the well.

In addition to the installation of new pumping equipment it was necessary to make some changes in the pumphouse. The roof was raised 7 ft. 4 in. to provide the greater head room necessary for the new oil engine. The floor had to be rebuilt to carry the greater load and the foundation was strengthened.

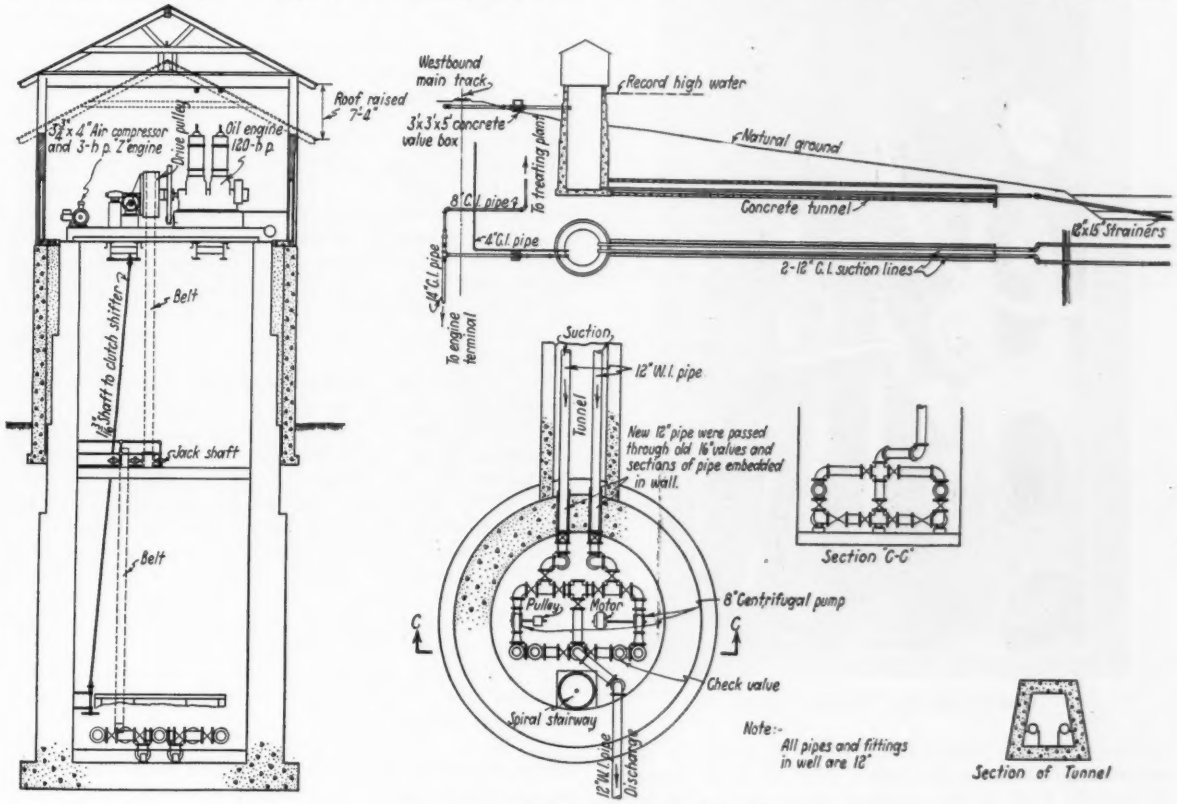
New Plant More Efficient

The normal operation is for one pump to deliver 1,500 gal. per min. against a total head varying from 180 to 210 ft. Under present conditions the consumption demands are such as to require this operation from 9 to 12 hours daily. The improved maintenance conditions and increased dependability of the new equipment are marked. With the centrifugal pumps, the former troubles caused by sand destroying the working parts and valves of the plunger pumps has been practically eliminated. With the old equipment it was necessary to keep a water supply gang continuously overhauling the pumps under adverse conditions while the present centrifugal pumps are readily accessible and the maintenance expense is small. The alternate use of electric or oil engine drive provides dependable stand-by power.

Additional Treating Facilities

Previous to the completion of the recent improvements, water storage at the engine terminal was limited to two elevated tanks of 100,000 gal. capacity each, one being a wood tub on a steel tower and the other a hemispherical bottom elevated steel tank. The water was treated and settled before going to storage tanks in a flat bottom steel tank 30 ft. in diameter by 80 ft. high with weir proportioning equipment at the top. At a rate of 1,500 gal. per min. the vertical velocity of the water through this tank was in excess of 16 ft. per hour, and although the capacity provided for a five-hour retention period this high velocity frequently carried mud and sediment over into the storage space with incident trouble in boiler operation and complaints from the village of Stevens, which is also supplied with water from this source. Both additional storage and sedimentation time were considered advisable in order to have a reserve supply in case of trouble and to overcome the lack of proper clarification.

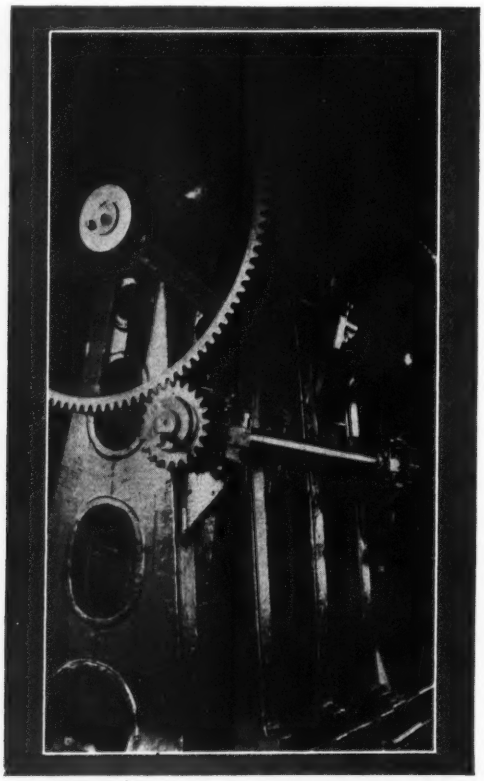
In addition, it was found that satisfactory attention could not be regularly given the chemical proportioning equipment located on top of the 80-ft.



Details of Pumping Plant as Rebuilt

tank because the weir and screens frequently clogged with trash. This was removed and replaced with a flow control valve in the discharge line, located in the chemical house at the foot of the tank. This valve was set to deliver 1,500 gal. per min. which, with a constant feed of chemicals, has insured satisfactory proportioning and placed the equipment where it can readily be given any necessary attention.

To insure adequate storage and thorough clarification, a standpipe type steel tank, 40 ft. diameter by 70 ft. high, was erected on a concrete foundation adjacent to the softening plant. The softened water leaves the treating tank at an elevation of 76 ft. and



One of the Old Triplex Pumps

is carried to the top of the new 40 ft. by 70 ft. tank, where it goes down through a tube 12 ft. in diameter to within 3 ft. of the bottom and rises to floating outlet pipes for delivery to the distribution system. These floating outlets normally operate at the 34-ft. level, but can lower to 4 ft. for emergency use. In this tank the water is given between three and four hours additional settling time and the vertical velocity is reduced approximately 7 ft. per hour.

With the improved facilities and aided by the use of sodium aluminate with the lime and soda ash treatment, good clarification is being secured and the hardness remaining in the water delivered for locomotive and general use is being maintained consistently below two grains per gallon with an attendant improvement in locomotive performance and general conditions.

A notable feature in connection with the new facilities is the manner in which they are being maintained. The interior of the pumphouse and well pit have been painted with "stay-white" paint. The pipe lines, valves, and fittings, as well as the engine and pumping equipment have an enamel coating and the entire installation is kept in a neat and orderly condition at all times. Little additional work is required to keep the entire plant in the best shape and this is reflected in improved operation and reduced maintenance.

Making Good Concrete in the Winter Time*

By F. H. McGraw
Construction Manager, Dwight P. Robinson & Co., Inc., New York

TO PLACE concrete in cold weather, even to build large, important and expensive structures in the midst of the severe winters of our northern climate, is no longer a novelty. It is done every winter in every large city, and in many small ones, and little is said about it. But to make concrete of the highest quality, equal to that produced under the more favorable conditions of summer weather, requires care and a high degree of control over conditions, which control may not with safety be omitted, neglected or relaxed.

It is the purpose of this paper to outline the conditions which must be maintained to insure a quality product, rather than to deal with methods or apparatus or appliances used to secure and maintain these conditions. Before considering these essential conditions, it may be well to list a few well-established and generally accepted facts about the setting and hardening of concrete at low temperatures which have a direct bearing upon quality.

1. Concrete will develop its strength faster at higher temperatures and slower at lower temperatures.
2. If concrete is to attain its designed load-bearing strength it must be kept above the freezing point of the water used in gaging.
3. If its designed load-bearing strength is to be attained in a reasonable period of time the temperature must be many degrees above the freezing point; 50 deg. F. is generally considered the point below which setting and hardening is greatly retarded.
4. Concrete does not develop strength to any considerable degree while frozen.
5. To permit concrete to freeze means practically to suspend its hardening process during the period that it remains frozen.
6. To permit newly placed concrete to alternately freeze and thaw during the setting and hardening period will seriously reduce its ultimate strength.

The Nature of the Safeguards

In the light of these facts, it is not difficult to determine rather definitely not only the nature but the extent of the safeguards and precautions which must surround concrete at low temperatures. The only safe procedure is to take measures which will positively insure against freezing, and if hardening at a normal rate is required to hasten construction progress or to strip forms in order to use them over again, the concrete should not be permitted to reach a temperature below 50 deg. F.

The problem under consideration may, therefore, be divided into two parts: First, to prevent freezing of the concrete; and second, to maintain a temperature which will permit hardening to progress at an approximately normal rate. The first part of the problem may be accomplished by either of two methods or a combination of them: (a) to maintain the concrete above 32 deg. F., and (b) to lower the freezing point of the

* A paper presented before the American Society for Testing Materials.

gaging water by adding a chemical compound to it. The use of the former method or a combination of the two is usually the safest course to pursue. The use of chemicals to lower the freezing point of concrete is effective over a limited range. The chemicals most commonly used to lower the freezing point of the gaging water are sodium chloride (common salt) and calcium chloride. Salt lowers the freezing point but it also slows up the hardening process. Calcium chloride lowers the freezing point to a greater extent than salt when used in equal quantity, but it accelerates the setting and hardening of the cement. A reduction of the freezing point by about 10 deg. F. is all that can be counted on by the use of calcium chloride without using such a quantity as would be injurious to the concrete. If the temperature of the air should drop below 22 deg. F., freezing would result unless heat were applied.

Heating the Materials

In climates where the thermometer is likely to drop below 22 deg. F,, the safest course is to provide heat. Heat may be applied by two methods, either to the aggregates and water used in making the concrete or to the structure after placing. Whether both of these methods are to be used or only the former depends upon the minimum temperature to which the concrete is likely to be subjected during its setting and hardening period. When the weather is moderate and a sudden or large drop in temperature is improbable, it is often considered safe to rely upon heating the aggregates and water before mixing. They should be raised to a temperature of 100 deg. F., but not above 150 deg. F., so that the resulting concrete may have a temperature of 80 deg. F. or more at the time of placing. Overheating of some types of aggregate should be avoided since they are liable to be injured at high temperatures. A number of effective devices are available for the purpose of heating materials.

The chemical reactions which occur when cement sets and hardens produce heat. The result is a perceptible rise in the temperature of the concrete. When the mass is large this heating effect offers considerable assistance in preventing freezing. If the temperatures were only a few degrees below freezing and could be counted upon to go no lower, the preheating of the concrete materials and proper covering of the placed concrete to retain the heat initially in the concrete, plus the heat generated during the setting period, would probably be sufficient to protect the work. If in addition there is dissolved in the mixing water from 2 to 4 lb. of calcium chloride for each bag of cement used, the work might be considered reasonably protected against freezing at a temperature of 20 deg. F.

What Is Reasonable Protection?

The phrase "reasonably protected" is used advisedly. In a high wind such concrete would freeze unless protected from it. But unfortunately our northern climate is not so dependable and other precautions are usually necessary for safety. Inclosing the structure and applying heat to maintain a temperature surrounding the concrete that is always above the freezing point regardless of the outside temperature is the one safe protection against freezing in northern climates in winter. If normal setting time of the concrete is the end sought, then these same measures are used, but sufficient additional heat must be applied so that not only is the concrete kept above its freezing point but is maintained at a temperature above 50 deg. F. for at least two weeks, and preferably longer, after placing.

Many types of inclosure that have been devised for retaining heat within and around concrete structures have been described and illustrated in articles in the technical press and in the literature of concrete construction. Suffice it to say that since their primary purpose is to safeguard the quality of the concrete in the structure by maintaining favorable temperature conditions, it is of first importance that such inclosures should be designed and constructed with such thoroughness and care as will insure their performance of this function.

Guard Against Rapid Drying

It is also important in such cases to insure against the too rapid drying of the concrete. The heat used to maintain the higher temperature not only quickens the setting but also accelerates drying, especially since the cold outside air is often of low relative humidity. When cold air, even of high humidity, is heated its relative humidity is greatly reduced. This warmed air, of low humidity, has a marked effect on the drying out of exposed concrete. Sprinkling should be practiced in such cases for a week or more after placing.

In conclusion, "quality" concrete, and permanent concrete, can be placed in cold weather if well known and generally recognized precautions surround it and intelligent supervision and control are mixed into it. Quality concrete in winter or summer is not a mixture of cement, sand, stone and water, but requires a fifth component—intelligent supervision.

The Spokane, Portland & Seattle Along the Snake River Canyon in Washington

Will a Concrete Roadbed Stand Up?

The First Year's Service of the Pere Marquette Installation Developed No Serious Defects

THE 1,326-ft. section of concrete roadbed supporting the westbound track of a double track main line of the Pere Marquette near Detroit, Mich., has now been in service for slightly more than a year. This radical departure from standard constructions, which was described in *Railway Engineering and Maintenance* for January, 1927, page 4, is being watched intently by railway men from all parts of the country. The results of the first year's service, which were presented before the Maintenance of Way Club of Chicago on December 21 by Paul Chipman, valuation engineer of the Pere Marquette, and collaborator with Frank H. Alfred, president of the Pere Marquette, in the design and construction of the roadbed, are, therefore, of interest.

Looking East Along the Concrete Roadbed

It will be recalled that this experimental installation consists of thirty-four 39-ft. slabs, 21 in. thick and 10 ft. wide, laid directly on the ballast subgrade without other preparation than the leveling off of the surface. In addition to ordinary reinforcing, a light steel truss is embedded in the concrete directly beneath each rail. The upper chord of this truss consists of two ¼-in. by 4 in. steel plates placed vertically with their upper edges slightly below the surface of the concrete. Attached to the steel plates at intervals are steel stirrups which afford a means of attaching the rail fastenings. The rails are laid directly on the concrete without blocks of any kind and with only a thin sheet of insulating compound beneath the base, to provide a uniform surface and insulation from the reinforcing steel in the slab. The rails are held in place by clips bolted to the stirrups embedded in the concrete.

The following is abstracted from Mr. Chipman's paper:

I think we may say that the practicability of a rigid roadbed, provided it is also a smooth one, has been proven beyond a doubt. A year's traffic has not resulted in any disintegration of the concrete beneath the rails nor in any undue battering of the rails themselves. The effect on rolling stock cannot, of course, be determined definitely by a test section a quarter of a mile long; but a ride over this section is enough to bring the conviction that there can be no bad effect. The train glides along so smoothly that one feels that a considerable saving in maintenance of equipment may be anticipated.

On the receiving rails at the sixty-eight joints one joint has a batter of 3/64 in., nine joints have a batter of 1/32 in., sixteen have a batter of 1/64 in., and in forty-two the batter is too small to measure. It would be hard to find a piece of ordinary track in use a year, under like traffic, that would show a better record. There are, however, a number of joints where the receiving rail is not battered at the end, but from 2 to 6 in. from the end a slight depression begins which varies in length from 6 to 18 in. In my opinion, this type of batter is due to the delivering rail being slightly higher than the receiving rail.

The indications are that there will be very little battering with this type of roadbed, except that due to inequality in the heights of adjoining rails. If this proves to be the case, grinding the high rail may prove advantageous. However, observation of the end of the delivering rail inclines one to the belief that batter of this type tends to correct itself by the wearing down of the delivering rail, and that after a certain stage is reached, its progress will be slow.

No Apparent Abrasion

In finishing the concrete rail seat no attempt was made to perfect the finish on any portion that would not lie immediately beneath the rail. This resulted, at places, in a slight ridge just outside of the rail seat, which makes it hard to be certain that there has been no abrasion of the concrete under the rail; but the fact that such apparent depression occurs only for short distances indicates that it is due entirely to the way in which the rail seat was finished, as the conditions which would cause wear are practically the same throughout, both as to the quality of the concrete and the motion of the rail. If, in the course of time, abrasion develops, it will prove the necessity for providing a metal bearing for the rail, as was done in the present installation. If it does not develop, the design can be simplified accordingly.

The other question of major importance is whether or not a roadbed of this type will retain its original smoothness. After the first year's operation our test section rides as smoothly as at the start. Levels taken from time to time show that while there was a slight and gradual settlement for a time, it was fairly uniform over the whole installation. As a whole the roadbed settled 0.038 ft. in the first 11 days after operation began, an additional 0.037 ft. in the next six weeks, and 0.015 ft. in the following two months. Practically no settlement occurred after April 12.

The amount of this settlement is rather surprising. The west half of the section was built over what had been a very shallow excavation, and the same is true of the south side of the east half. The north side of the east half was over a light embankment of sand varying in depth from nothing to 2½ ft. The side over the fill has not settled any more than the side over the cut. The bottom of the slab

was level with the bottom of the old ties, so that the ballast under the ties was not disturbed. Evidently, the ballast was driven down into the sub-grade, as, after three years of traffic, the ballast must have been fully compacted. It is well known that this action occurs in the case of ordinary track, but it was hardly to be expected under a continuous slab. The other surprising feature about this settlement is its uniformity. The variation in settlement is so gradual that it has no effect whatever on the riding quality of the track. It is not likely that this installation will ever call for lifting any of the slabs in order to restore the old grade.

Last winter was rather mild and it is not probable that there was much, if any, frost under the concrete. With the thorough drainage provided by placing the concrete on top of the old ballast and by laying a tile drain close to the inner edge of the slab, it is doubtful if there will be any heaving during the most severe winter than may be expected in this latitude. This, however, is one of the things that is yet to be demonstrated.

Concrete Is in Excellent Condition

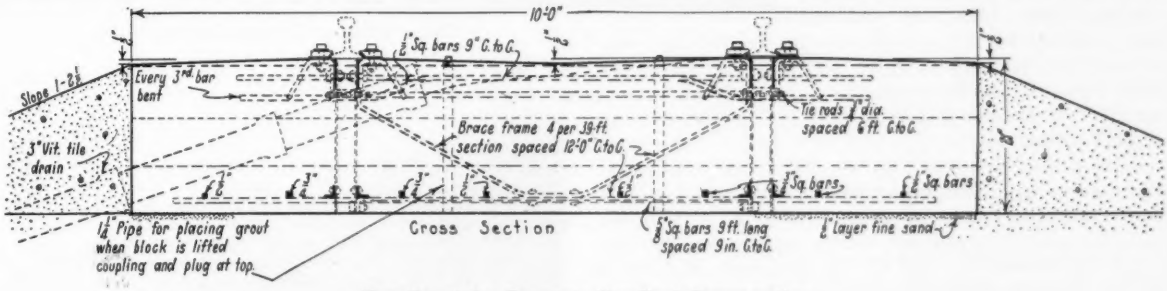
The concrete is in excellent condition. In slabs Number 1, 11, 33 and 34, hair cracks have appeared which extend the full width of the slab. In Slab 1 this marks a construction joint located about 10 ft. from one end, delays incident to starting the work having made it impossible to finish this slab on the first day. Slabs 33 and 34 were laid in very cold weather, although this may not be the reason for the cracks. None of the cracks shows any indication of widening, and levels fail to show any deflection at or near the cracks. It was expected that some such cracks would appear. With the exception of Slab 1 they are all near the center of the section in which they occur.

When operation began, the rail on the east approach started creeping westward in the direction of traffic and pushed the rails on the concrete forward until the joints were closed for several hundred feet. The rail was put back in place and the approach anchored, since that time there has been no trouble with creeping. The maximum movement has probably not exceeded three inches.

The sound made by a train in passing over this section is different from that on ordinary track. There is a rumble that has a touch of metallic clang, probably due to the reflection of the noises made by wheels and trucks from the surface of the concrete. However, there are no clicks when the wheels pass over the rail joints. Probably the sum total of the noise is no greater than on ordinary track, although its quality is different.

Our experience with this test section has brought to light a number of ways in which the present design can be improved. The fibre mat which was placed under the rail was found to be unsuited for the purpose. This material has little strength when saturated with water and in spite of its asphaltic content, is quite absorbent. After becoming wet the edges dry before the center, and the lateral motion of the rail is sufficient to split it and cause it to work out at each side of the rail. After this happened, much trouble was experienced with signals after a rain. This trouble was found to be, for the most part, near the west end, where in two or three places the steel plates come close to the surface. This was relieved temporarily by blocking the rail up on small pieces of insulating fibre, but trouble was still experienced during and after rains. Within the next few days a strip of insulating fibre will be placed under one rail for the entire length of the section. The whole problem of insulation can be solved by so changing the design that the rail will not be in contact with or close to any other metal which would convey current to the ground or to the other rail. If it is necessary to provide a metal bearing for the rail, such bearing must not be connected with any tie rods or reinforcing bars.

I believe that our experience with this roadbed is sufficient to convert any person who had been opposed to the canting of rail. It is unfortunate that this was not done on our experimental section. After a year's service, parts of certain rails are not much more than half covered, owing to the rail not being canted. Such batter as has taken place is much more pronounced on the inside of the rail.



Details of the Concrete Roadbed Construction

Bolts Must Be Tight

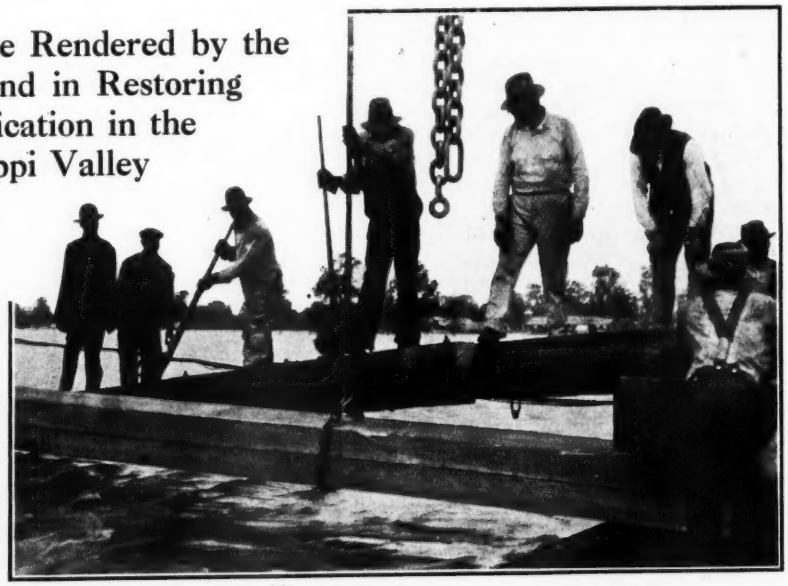
One feature, the importance of which was realized when this section was built, has received added emphasis from our experience. This feature is the importance of having as close a contact as possible between the base of the rail and its support and of maintaining this close contact by keeping the bolts which fasten the rail to the roadbed tight. It is important to reduce both vertical and lateral movement of the rail to the lowest possible limits. Three-quarter inch bolts were used for this purpose, but they should be ⅞ in. or possibly 1 in. A small number of these bolts have failed by the heads snapping off. This is more apt to occur in cold weather. Nut locks were used under the bolt heads to relieve the shock due to sudden lifting of the rail at points where the surface of the rail seat was a little lower than it should be, but these do not seem to accomplish their purpose fully. Nearly all of the failures were at the ends of the section where it joins the ordinary track construction, and were evidently due to the greater vertical motion of the rail at those points. The failures at other places were, in part, at least, due to defective bolts.

Fighting the Great Flood*

The Story of the Service Rendered by the Railways in Relief and in Restoring Lines of Communication in the Lower Mississippi Valley

By C. R. KNOWLES

Superintendent Water Service,
Illinois Central System



Many Miles of Trestles Were Driven

THE Mississippi Valley flood of 1927 has been called the greatest peacetime calamity the country has ever experienced. In addition to the damage wrought to the homes, business and lands of the people of the valley, 3,000 miles of railroad was affected to the extent that all traffic was suspended for periods of from 10 days to 3 months. The damage to the railroads extended into seven states and exceeded $10,000,000 for protection and repairs alone.

The people who live in the territory subject to inundation have learned to look to the railroads that serve them, not only for assistance in protecting the land from floods, but for means of escape after the levees have broken. As soon as the news of a break in the levee is received, messages are sent in all directions by telephone, telegraph and messengers, warning the people to get to places of safety as quickly as possible. Special trains are made up immediately and rushed to the flooded territory for rescue work, many of them operating under hazardous conditions.

Rescue and Relief Work

Much of the rescue and relief work performed by the railroads was truly first aid as they were not only on the job immediately after the breaks occurred in the levees but had made preparations for relief and evacuation prior to the breaks. For example, the Yazoo & Mississippi Valley, a part of the Illinois Central System, placed many cars of company coal at such strategic points as Greenville, Miss., Cleveland and Rolling Fork, for use by the water works, electric light and other plants dependent upon coal for fuel. Passenger equipment was also placed at these points to facilitate the prompt evacuation of the stricken area.

The Mound Landing break in the east levee just above Greenville, Miss., occurred at 7:30 a. m., April 21. At 7:35 a. m. the news of the break was received in the office of the general superintendent of the Yazoo & Mississippi Valley at Memphis. Rescue trains began to move at once and within two hours 25 relief trains were either in the vicinity of the break or en route. Regular passenger trains were turned back to the flooded territory, locomotives were taken from freight trains and relief trains made up of passenger equipment which had been held for this purpose. These trains were in constant service to and from the flooded area until all refugees had been rescued.

New Track Was Laid in Some Cases Rather Than Attempt to Restore the Old Track

The number of lives saved and the amount of suffering prevented by this prompt action on the part of the railroads will never be known but there is no doubt, particularly in the minds of the people of the valley, that the railroads were one of the most important agencies of relief throughout the duration of the flood and undoubtedly the principal factor in relief work immediately after the breaks in the levees, as the entire railroad organization was directed toward rescue and relief, and they could and did act before other organized agencies were on the ground.

The Illinois Central alone operated 311 rescue

*From a paper read before the annual convention of the American Railway Bridge and Building Association at Minneapolis, Minn., on Oct. 18.

trains and handled 46,381 refugees. It also furnished 1,674 cars to be used for living quarters, some of which were occupied for more than 60 days; 892 cars of household goods and 759 cars of live stock were moved, virtually all free of charge. Moreover it transported free of charge 1,294 cars of food, clothing, supplies, etc., for the relief and rehabiliation of the residents of flooded areas, and hundreds of carloads of boats and airplanes, tents, seeds and other supplies. The value of the free service rendered was $437,454, of which $246,172 represented handling Red Cross and other supplies and personnel; $115,952, handling refugees, and $75,330, the value of box cars provided for living quarters for refugees. The employees supplemented these contributions by giving more than $32,000 in money and many carloads of clothing and supplies for the relief of the flood sufferers.

More than a million levee sacks and the services of thousands of employees were supplied by this road to aid the citizens of threatened communities in preventing breaks in levees. In addition to furnishing labor and material for the construction of protection levees, reinforcement of existing levees and other similar work, pumping equipment was furnished seven cities and towns on the lines of the Illinois Central for pumping out inundated areas.

Three Phases of Combating Floods

From the standpoint of railroad operation, combating high water may be divided into three general phases: 1.—Precautions to prevent overflow and to minimize the damage to tracks and structures when such overflow occurs; 2.—Efforts to remove inhabitants and their personal property and live stock from the overflow area; 3.—Restoring track and bridges to service and opening the line to traffic within the shortest possible time.

Wherever there was a probability that the territory would be overflowed, all material possible was removed from the overflow area and stored on high ground. Track gangs were recruited to full strength, and additional gangs held in readiness to move to the inundated area. Cinders, gravel and other ballast and filling materials were assembled in readiness for use. Large quantities of sand bags were purchased, and in addition to those used for protecting the ends of bridges, topping levees and protecting railroad embankments from wash, filled bags were stored in convenient locations. Track and bridge decks were anchored wherever possible to prevent their being washed out of line.

Work Train Moving Over a New Trestle—Note the Heavy Flow of Water Which Often Caused Continued Erosion

Sand Bags

Sand bags play a most important part in the protection of railroad tracks and other property along the Mississippi river during periods of high water. The bag ordinarily used for this purpose is of burlap but as this type is not always readily available almost any kind of a bag is used in an emergency. Their average cost is a little over 7 cents, while their cost filled and placed ranges from 15 cents to 50 cents, with an average of approximately 20 cents.

Cinders, sand, clay and gravel are used to fill the bags, bank-run gravel being the best material, as a wall constructed of bags filled with bank-run gravel containing gravel, sand, and clay will form a watertight wall and will set almost equal to a wall of masonry. Clay is impervious to water but has a tendency to slide when the bag becomes water-soaked and will not stand any great pressure unless the bags are well confined. Water will filter through bags filled with sand, permitting a great deal of seepage. Cinders are useful only for protection against wavewash as the water will pass through cinder bags readily; they are also too light to be used in a wall designed to withstand any pressure.

Sand bags used in railroad protection are filled by hand and are usually loaded on flat cars for distribution to points where required. The bags are only filled two-thirds to three-quarters full to permit

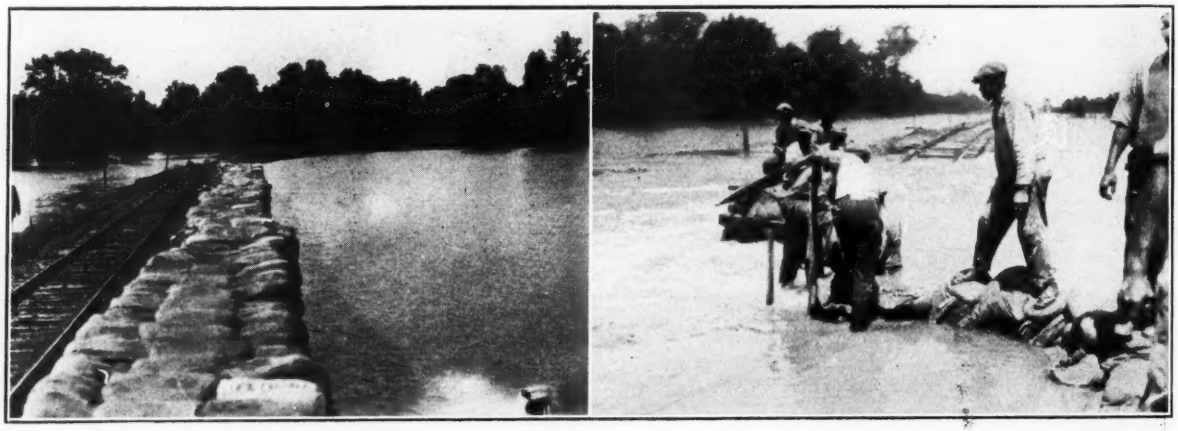
Another Example of Rapid Flow Through Breaks in Roadbed

the material to adjust itself in a wall and form a water-tight barrier.

One of the most important uses of sand bags is to circle sand boils. A sand boil is formed by water finding its way under a levee through a weak spot in the earth, a hole caused by a burrowing animal, a drain, or other opening. If the boil is allowed to continue, the hole becomes larger and larger until the volume of water passing through it gets beyond control and the levee is undermined and crumbles in.

So many sand bags were required in the protection of railroad and city property at Mounds, Ill., and Cairo during the recent flood that it was impossible to fill sufficient bags on the ground. As a result every division on Northern and Western Lines as far west as Dubuque, was called upon to load and ship sand bags to Mounds and Cairo. These divisions loaded and shipped 566 cars containing 349,636 bags of sand, 70,000 bags being filled on the Chicago Terminal division alone.

At Vicksburg, a total of 618,000 bags was used during the flood, while just across the river from Vicksburg at Delta Point, 150,000 bags were used to form a wall protecting the incline and track approaches against the river current. This wall extended from the incline to the main levee, a distance of 2,300 ft. and had an average height of seven feet. The wall was about four feet thick and was braced on the inside with a row of sacks three feet thick and four feet high.



A Sand Bag Protection and the Use of Sand Bags to Restore Track

Protective Measures

Two of the largest flood protection works ever successfully undertaken by railroads in keeping the line open were carried out by the Illinois Central at Baton Rouge, La., and by the Southern Pacific on its Louisiana lines between New Orleans and Lafayette, La.

At Baton Rouge a double-track main line forms the levee. It was necessary to raise this roadbed from five to ten feet for a distance of two miles, which included raising a 300-ft. double-track bridge 3 ft. and constructing dikes from the roadbed to the bluff on each side of the bridge. It was necessary to sack the embankment on the river side, and in order to hold the sand bags and protect the embankment against storms, fascining was required throughout the full length of the exposed fill. This fascining consisted of a tight board wall formed by 4-in. by 4-in. posts driven into the bank below the water edge and faced with planking, the posts being held in position by wires anchored to the track. A total of 8,000 ft. of sacking was necessary. This work required 400,000 levee bags, 45,000 ft. of lumber for revetting and fascining, 3,000 lb. of wire nails, 26 rolls of No. 10 wire and 2,250 cars of gravel.

On the same division the entire maintenance force from Baton Rouge to New Orleans was placed at the disposal of the government and was engaged in protecting the east bank levee system within these limits throughout the duration of the flood, only skeleton section gangs working on the railroad.

The work done on the Southern Pacific consisted of raising 7½ miles of main line track on cribbing to keep the track above the rising water from the crevasses on the west bank of the river. In constructing this cribbing the rails and tie plates were removed from the ties and an 8-in. by 16-in. stringer placed flat under each rail; 7-in. by 10-in. ties, spaced 12 in. were laid flat on the top of the stringers, resulting in a minimum raise of 15 in. Where necessary a maximum lift of 26 in. was obtained by using an additional 7-in. tie and two 2-in. by 12-in. timbers. The stringers were drifted to the ties, which were left in the ballast, and drift pins were also driven outside of these stringers to keep them in line. Untreated sawed oak ties without tie plates were used in the track in its elevated position on top of the cribbing. The structure thus completed was anchored every 30 ft. on each side by driving an 8-ft. tie flush with the rail, or a little below, and wiring the track to these posts. The cribbing was filled with loose gravel flush to the top of the track ties, with a considerable amount of gravel on the outside of the stringers.

In carrying out this work six bridge gangs, averaging 10 men each, and three extra gangs, averaging 45 men each, were employed; one work train distributed material ahead of the forces and another work train with a pile driver was employed in handling the timber. For run-offs a stringer sized from 8 in. at one end to 4 in. at the other, and one sized from 4 in. at one end to nothing at the other, were used.

The cribbing was put in at the rate of about 18 ft. per minute actual working time and was done during given periods of the day, which were usually about four hours in the morning. No traffic was permitted over the line while the work was going on. All of the track was cribbed in about one week's time with

the forces working approximately four hours a day.

The Louisiana Railway & Navigation Company followed a unique method in raising nearly six miles of track between Sarto and Naples on its Louisiana line on river sand. A tight board wall was constructed on each side of the track by driving 2-in. by 4-in. posts in the ground, seven feet apart, and placing 2-in. by 12-in. planks against them, filling in between the two walls with river sand and raising the track on it. The walls were 15 ft. apart and were wired every 12 in. to prevent spreading. They were also anchored every 50 ft. to trees or a pile. Five and three-quarters miles of track was raised an average of a little over five feet in this manner.

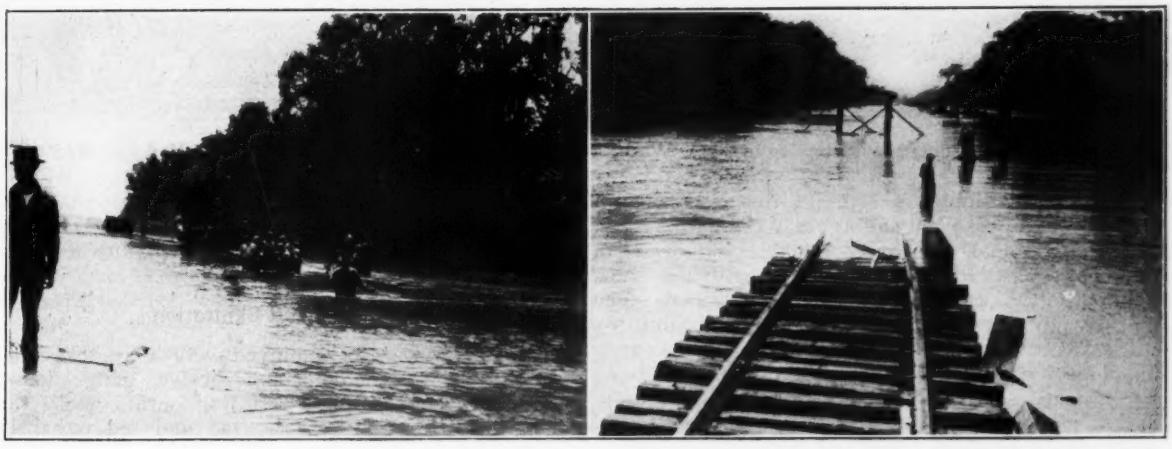
Rehabilitation and protection work of another type was also done at several points on the Illinois Central. At the Mounds, Ill., yard and in the waterfront district of Vicksburg, this road used the largest pumping plant ever placed on wheels, constituting a portable emergency plant, which included one 15-in., one 12-in. and one 10-in. centrifugal pump, all electrically driven, with a combined capacity of 20,000,000 gal. a day (described in *Railway Engineering and Maintenance* for June, page 244). The complete outfit was mounted in box cars. In addition to these three pumping units, 20 smaller temporary pumps were installed by the Illinois Central at Vicksburg, 13 of which were steam pumps mounted on flat cars so that they could be moved from place to place as necessity required. The combined capacity of a heavy current, in some cases with the fill and ballast being washed out as the work was being carried on.

Derrick cars were used for unloading material, which was rafted ahead and placed by men working in water, often waist deep. In the reconstruction of the track through the Grassie Lake swamp, where nearly five miles of track was repaired under water, two 12-in. by 12-in. timbers, 30 ft. long, were drifted together with ties and floated into position ahead of the track, over a mile of track being repaired in this manner.

Use Boats With Outboard Motors

Piling, stringers and ties were rafted together and towed to the point of work by boats equipped with outboard motors. This greatly facilitated the work, as it was sometimes necessary to raft the material through the water for a distance of half a mile or more. By handling material in this manner it was possible to place the filling and ballast without interrupting the work of cribbing ahead of the filling operation. It was found that one of these outboard motors could easily transport 12 stringers to the point of work at one time.

To facilitate restoring the Vicksburg Route division to service at the earliest possible date the work was carried on day and night, portable electric lighting systems being installed on rafts and flat cars to provide illumination for the night work.



How the Track Lifting Frame Was Used to Pull Track Back Into Place

all pumps installed and operated by the railroad at Vicksburg was 48,240,000 gal. a day, or sufficient to supply a city with a population of 1,000,000 people.

Repairs to Roadbed and Structures

If one can imagine water covering 374 miles of track, damaging 269 miles, making it necessary to crib a total of 34 miles and drive three miles of trestle, reballast 118 miles, reline 98 miles and resurface 130 miles, he will gain some idea of the effect of the flood on a single road. The work of carrying out protective measures against the flood and repairing the damage to track and structures was in large measure similar to the procedure in ordinary floods. However, the 1927 flood was of such magnitude that it called for unusual efforts and methods in many cases. For example, much of the reconstruction work was carried on with the track under three or four feet of water and against

Stone, slag and bank-run gravel were used for raising track and reballasting. Where the work of raising the track was done with the water over the rail, the track was raised on slag or stone and carried over holes on cribbing and piling. At other points where the ballast was washed out but the track was not submerged, bank-run gravel was used. The gravel was distributed from cars with a Lidgerwood plow and the slag and stone were unloaded from hopper-bottom cars.

Much of the track was washed off the embankment and unique methods were used to pull it back in position. This was accomplished by constructing a track-lifting frame of 12-in. by 12-in. timbers attached to stringers to permit floating it into position. One leg of the lifting frame was four feet longer than the other to take care of the variation in ground levels, the short leg of the frame being set on the fill and the long leg on the side of the fill.

A heavy block and fall was set in the center of the cross-beam of this frame for raising the track off the ground; a second block and fall was connected to trees off the right of way and the track raised and pulled into position by means of a derrick car, this method greatly facilitating track repairs. Where the track was badly twisted or deep holes were cut in the bank, the track was cut loose and new track laid on pontoons, as previously described. Most of the cribbing was done with 12-in. by 12-in. timbers laid crosswise of the track with 7-in. by 16-in. stringers immediately under the rail. All of this material was floated into position by boats equipped with outboard motors and placed by men who often were working up to their waists in water.

In many cases comparatively shallow holes were washed in the track that could be filled readily with-

The Men Often Worked in Water Up to Their Waists

Surfacing Track After the Water Had Subsided

out extensive cribbing except for the swift current which would wash the filling material out as fast as it was applied. To overcome this, bulkheads of sand bags were constructed parallel with the track to arrest the current, swinging ties were then blocked up with sand bags or cribbing and the track was raised on gravel or other material, usually unloaded by hand from flat cars. Where the bank was washed so that it did not offer a secure foundation for the bags, a bulkhead was constructed of posts driven in the ground and faced with planking to hold the bags in place.

Employ Twelve Pile Drivers

A total of 12 pile drivers was used in the flood work on the Illinois Central system. On one piece of track on the Vicksburg Route division, 126 bents were driven with 35 ft. piling, the piling cut off and the caps, rails and ties laid ready for service in 128 hours. This work was done in water from 6 to 10 ft. deep and in a swift current. On that portion of the line in the vicinity of the Mound Landing crevasse, the swift current from the break in the levee cut long, deep holes in the track. Five bridges were washed out within a distance of two miles, the water leaving large "bleu" holes from 45 to 65 ft. deep. The work of bridging these holes was extremely difficult on account of the depth of the water and the swift current. However, the work progressed at the rate of seven bents complete, including caps, ties and rail in each 12 hour shift. Piling 60 to 90 ft. long was used; the caps were 12-in. by 14-in. timbers 12 ft. long, while the stringers consisted of three 7-in. by 16-in. stringers, 28 ft. long under each rail.

The maximum force engaged in flood work on the Illinois Central was 5,000 men, of which 3,758 men were used in the work of protection and repairs on the Yazoo & Mississippi Valley. This included 422 bridge men and 2,339 section men but did not include 516 men on levee work south of Baton Rouge. In addition to the division gangs, which were recruited to full strength, 12 bridge gangs and 10 extra gangs, comprising about 700 men, were furnished by other divisions not affected by the flood. The supervisory force was composed of the division and general officers, together with a number of roadmasters, division engineers and supervisors from other divisions who were selected largely for their experience in flood work. On account of the widely scattered nature of the work and the difficulty in communicating with the various portions of the flooded territory the work of repairs was divided into districts with one man in charge of each district.

Housing and Sanitation

Most of the forces employed were housed in camp cars, the extra gangs and bridge gangs being equipped with complete boarding outfits, while the supervisory forces were housed and fed either in business cars or in temporary outfits consisting of dining and sleeping cars. Where no other cars were available standard Pullman cars were used for sleeping quarters. Particular attention was given the distribution of provisions, ice and water. Raincoats, rubber boots and rain hats were furnished employees wherever required but they were of doubtful value when making repairs to track on account of the depth of water, at is was not at all unusual to see men cut holes in the toes of their boots to allow the water to run out, the boots being used chiefly for protection against snags, stones and snakes.

Everything possible was done for the comfort and welfare of the men and the distribution of water and ice of known purity was given particular care. To these precautions, together with preventive measures against malaria, are due the credit for the remarkable absence of sickness among railroad employees throughout the flood. The medical staff of the railroads worked hand in hand with the state health departments and those of counties, parishes, and

cities, medicines and chemicals being furnished freely at the expense of the railroads.

Too much cannot be said of the spirit and morale of the men engaged in the stupendous task of protecting and repairing the railroads as the epic story of the work of these men will never be written, due to the fact that, as good railroad men, they have simply taken it all as a part of the day's work. In sand-bagging track, driving bridges through raging torrents, raising track in water—sometimes up to the shoulders—diving under the flood to throw a submerged switch, working long hours under the boiling sun or in the driving rain, patrolling miles of water-hidden right-of-way, both in boats and afoot, the same spirit was evident, regardless of rank. A noteworthy comment on this spirit of co-operation is that after three months of active participation in flood work, one general officer remarked that not once did he hear a voice raised in anger, or an order issued that was not obeyed at once, if not anticipated.

Material Was Furnished Promptly

The material furnished during the flood comprises so many different articles that only a few of the more important items can be mentioned. Included in the list were 128 boats, 104 pairs of rubber boots, 27 outboard motors, over 2,000,000 levee bags, 300 raincoats, 219,800 lin. ft., or 40 miles of piling, 12,840 lin. ft. of 12-in. by 14-in. caps for bridges alone, with perhaps an equal amount for cribbing, 86,706 lin. ft. of 7-in. by 16-in. stringers for bridges and 25,000 lin. ft. used in cribbing, 215,700 cu. yd. of ballast and 192,000 cu. yd. of filling.

Material was furnished by the store department from regular stocks where available or by direct purchase. Ties, piling and bridge material were furnished chiefly from the timber storage plant at Grenada, Miss., supplemented by purchases direct from mills. Gravel was furnished from plants on our own line, and slag from Birmingham. It is a tribute to the supply department that everything to carry on the work was furnished promptly, and there was no instance throughout the flood where any delay or inconvenience occurred through failure to secure material as needed.

The cost of protective measures carried out by the Illinois Central system was $546,588, and the cost of repairing tracks and roadbed damaged by the flood $1,627,752, a total expense for protection and repairs of $2,174,340.

The actual physical damage to all railroads, including the cost of protective measures prior to and during the flood has been estimated as approximately $10,000,000. This figure, however, does not include the increased cost of maintenance of repaired track which followed the restoration of service. It is impossible even to estimate with any degree of accuracy the further damage to these railroads which has resulted through the delay and loss of traffic, cost of trains furnished for rescue and relief service and detouring over other lines, or the ultimate effect upon railroad business through the damage occasioned by the loss of crops and general interruption to business in territory adjacent to these railroads.

Discussion

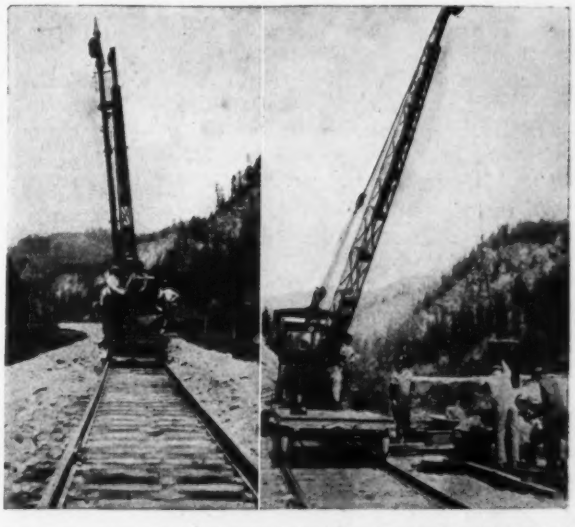
In reply to a question, Mr. Knowles stated that so far as he could learn only one railroad employee lost his life in fighting the flood, this man losing his footing and falling into a "bleu" hole.

W. C. Swartout (M. P.) then described the loss of the Baring Cross bridge of the Missouri Pacific at Little Rock, Ark., where three spans (356 ft., 177 ft. and 188 ft. in length), two cylinder piers, one pivot pier and one rest pier were carried out. As an illustration of the resourcefulness of the railways in this emergency, surveys were started on the day after the bridge went out to determine if it was possible to build a connecting track by which through trains could cross another bridge a short distance downstream without a back-up movement which the existing layout required and it was found that this could be done by building a track on a 20-deg. curve through two gas holders which were then in service. Permission was secured to demolish these holders and they were wrecked by company forces in 20 days.

To do this work, the holders were first telescoped to the maximum limit. Air compressors were brought from the shops and the holders were then raised to their maximum height on air. This eliminated all necessity of scaffolding around the outside of the holders and shop forces working from the top of the holders demolished the frames with oxyacetylene torches as the holders were lowered.

Rail Crane Moves Semaphore

THE possibility of avoiding the necessity for a work train in handling heavy materials through the use of a rail crane is demonstrated by the service rendered by a Fairmont-Parsons No. 3 rail crane on the Great Northern near Newport, Wash., where a battery well and a semaphore signal were transported and erected with this machine with the aid of a push



How the Semaphore Signal Was Transported and Erected by the Rail Crane

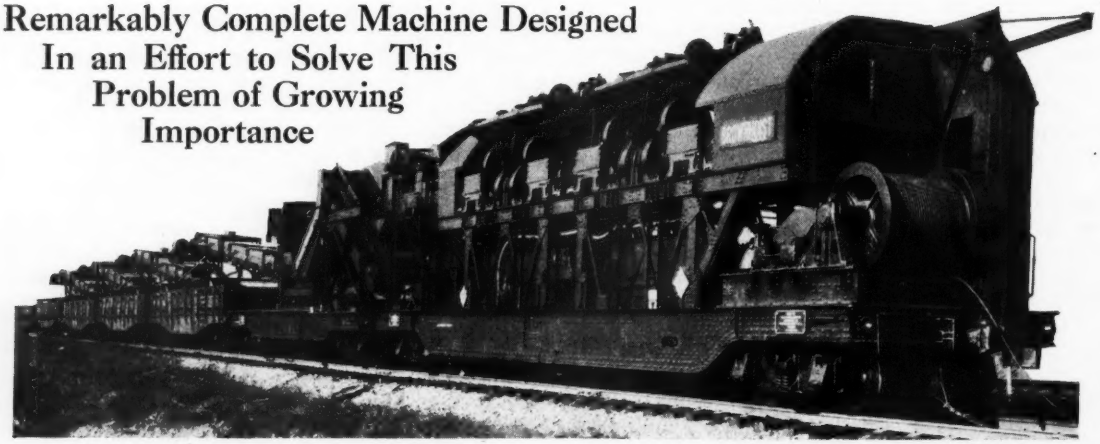
car. The 3,400-lb. battery well was picked up by the crane and loaded on a push car. Propelled by its own motive power the crane then hauled the loaded trailer about one mile to the new location and set the battery well in position.

On the next trip the 1,200-lb. semaphore was picked up and set on the push car, as shown in the photographs. Held in this position by the crane it was towed to the new foundation and set in place.

The signal and battery well were moved in approximately 30 min. at a cost of $15. As the charge for a work train to do this job would have been around $50, a direct saving of about $35 was effected.

Cleaning Ballast at the Rate of a Mile a Day

Remarkably Complete Machine Designed In an Effort to Solve This Problem of Growing Importance



A General View of the Ballast Cleaning Machine Including the Main Car, the Screening Car and the Dirt Cars

THE INDUSTRIAL Brownhoist Corporation, Cleveland, Ohio, has recently completed and placed in test service a complete self-contained ballast cleaning machine designed to overcome many of the obstacles encountered in the cleaning of ballast by methods now in use. Among the features of the machine of especial interest are that it is capable of cleaning ballast in wet weather; that, as compared with present methods, only about one-third of the labor is required to cover the same ground; that it is power-controlled and operated by electricity and air furnished by units which form a part of the equipment and that the machine, as a whole, operates within clearance limits such as not to interfere with traffic on adjacent tracks.

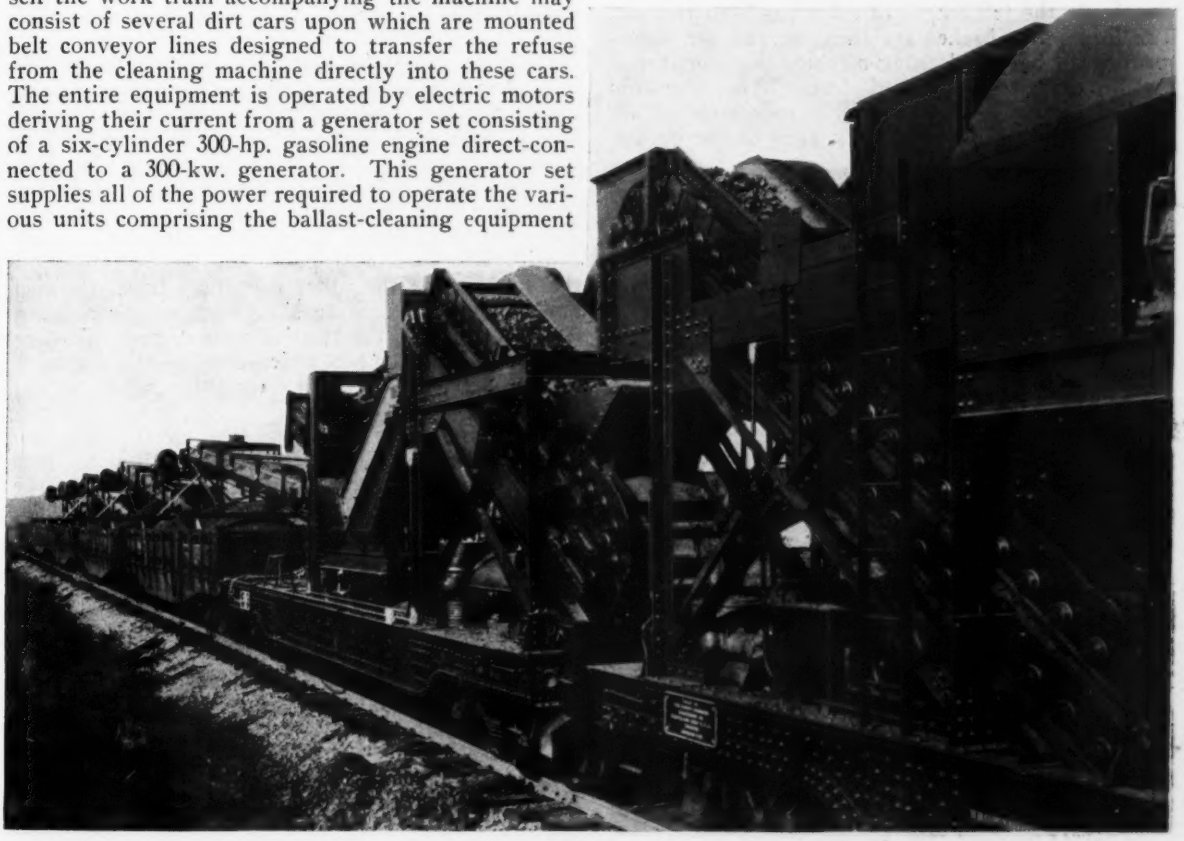
In the cleaning of ballast one of the disadvantages of some types of equipment has been the fact that traffic is interfered with, not only on the particular track on which the work train is operating, but also on adjacent tracks. In the design of this new machine there need be no interference with traffic, except on the one track on which the equipment is operating. Furthermore a normal ballast-cleaning operation with locomotive cranes and clam shell buckets has required four cranes and a gang of about 20 men in addition to a train crew to clean a mile of track a day. The new machine is said to be able to clean the ballast in about a mile of track a day with an operating crew of only seven men. Actual service tests which have so far been made have indicated

A Side View of the Machine Showing One Bucket in the Ballast and the Other Discharging Into the Hopper With the Plow Loosening the Ballast Between the Buckets

the possibility of even cleaning ballast successfully in exceptionally wet weather. This feature alone is expected to result in the addition of two months each year to the period in which ballast-cleaning operations are usually carried out under present methods.

In the design of this machine the builders have adhered to clearances and weights prescribed by the American Railway Association and in general it may be said that this equipment can operate over any roadway on which the usual type of wrecking derrick equipment can be moved.

The ballast cleaning machine consists primarily of equipment carried upon two cars, each supported on four-wheel trucks and, considering the two cars as a unit, having an over-all coupled length of approximately 100 ft. In addition to the machine itself the work train accompanying the machine may consist of several dirt cars upon which are mounted belt conveyor lines designed to transfer the refuse from the cleaning machine directly into these cars. The entire equipment is operated by electric motors deriving their current from a generator set consisting of a six-cylinder 300-hp. gasoline engine direct-connected to a 300-kw. generator. This generator set supplies all of the power required to operate the various units comprising the ballast-cleaning equipment and for the movement of the entire machine along the roadway as it performs its work.



A Side View of the Apron Conveyors, Hummer, Screen and Dirt Cars

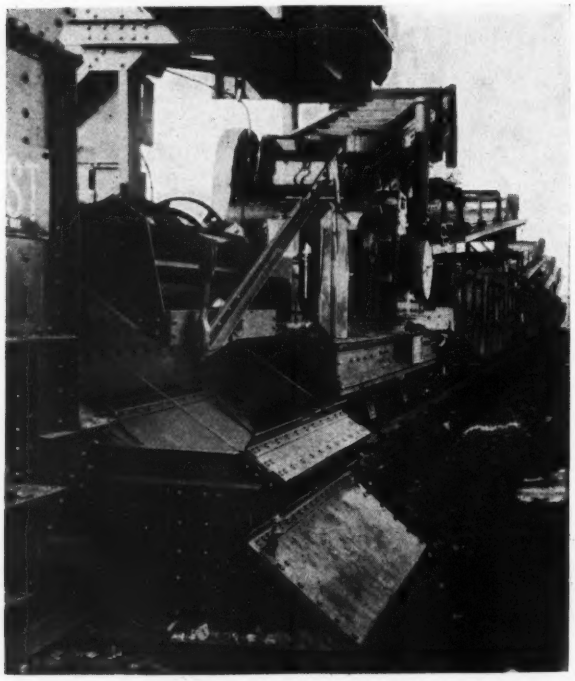
The movement of the equipment on the track is accomplished by an electric haulage unit through the use of a cable, the block for which is secured to a locomotive at some distance from the machine, which acts merely as a "dead-man." On the first car on which the machine is mounted, beginning at the end toward the locomotive, is the motor driven drum for the hauling cable and in the same enclosed cab the controllers for the forward bucket and the air brake equipment for stopping the machine. There are two clam shell buckets of one-half yard capacity which perform separate functions. One of these buckets is controlled from the forward cab while the operation of the other bucket is controlled from a cab near the opposite end of the car. The buckets operate in channel guides which prevent them from swinging beyond a point midway between the centers of a double track roadway. With the exception of a single part, described later, no part of the machine, while in operation or otherwise, extends beyond this midpoint between the two tracks.

Between the two buckets is located a plow which is raised and lowered on guides at an angle of approximately 45 deg. with the vertical center line of the machine and controlled by separate controllers and an independent operator. In the bucket compartments are located the receiving hoppers, underneath which is a conveyor which transports the uncleaned ballast to the rear end of the first car preparatory to dumping it onto another conveyor leading to the cleaning screens.

The gasoline engine generator set is located on one side of the rear end of the first car. On the opposite side is the conveyor line previously mentioned, underneath the slope of which is located a motor-driven compressor set that furnishes all of the compressed air required for the operation and control of the ballast-cleaning machine, making it unnecessary to draw any air from the train line. On the second or rear car are located the conveyors which receive the uncleaned ballast from the conveyor on the first car and transport it to specially designed vibrating screens which separate the refuse from the ballast and in turn dump it into a dirt chute from which it is carried by a conveyor to the rear end of the second car while the cleaned ballast is dropped into a separate hopper preparatory to distribution along the track. At the rear end of the second car is a boom loader, by means of which the refuse may be dropped on either side of the track or dumped

into the receiving hopper of a belt conveyor line mounted on the first of a series of dirt cars. The conveyor lines mounted on the dirt cars are arranged in such a manner that the refuse may be scraped off from the conveyor belt at any desired point in a car or carried on to other dirt cars in the train.

In operation the ballast-cleaning machine, together with the accompanying dirt cars, is moved by a locomotive to the desired point along the right-of-way. While it is possible for the machine to be moved, during operation, by a locomotive the cable and drum equipment permits the movement of the machine at the will of the machine operator without the necessity of signaling to an engine crew. To accomplish this the cable block is attached to the rear of the locomotive and the locomotive is in turn moved out slowly along the track ahead of the machine until practically the full length of cable has been run out. The locomotive brakes are then set and the movement of the ballast-cleaning machine is accomplished by the electrically-operated drum. The operation of the machine is designed for a movement of approximately seven feet for each grab of the bucket,



The Ballast Return Chute With the Dirt Conveyors in the Background

the maximum opening of each bucket being eight feet. The forward bucket digs up the ballast from a point adjacent to the ends of the ties under the track on which the machine is operating to a point midway between the two tracks and to a maximum depth of 24 in. below the ties, depending upon the condition of the roadbed. Behind the forward bucket is the plow, the depth of which is adjustable. The plow digs out the ballast previously untouched by the forward bucket and throws the material into the excavation made by the forward bucket. This material is then picked up by the rear bucket. As previously mentioned both buckets, when raised to their maximum height and opened, drop the material into the receiving hoppers from whence it is transported to the cleaning equipment, after which the screened ballast is finally laid down in the trench made by the buckets in picking the material up. The screened ballast hopper is provided with an adjustable scraper so that the ballast may be placed in the trench smoothly and at any desired depth.

When to Discard Wire Rope

THE decision as to when worn wire rope should be discarded is one to which no definite rules can be applied, since much depends on the service in which the rope has been used and the care with which it has been maintained. In order that the economical service life may be obtained, while giving due regard to safety, C. D. Meals, rope engineer of the American Cable Company, New York, has formulated the following suggestions as to the consideration of various factors in discarding wire rope.

In worn cable the metallic area apparently uninjured cannot be taken as the sole criterion, as two ropes from the same reel and showing the same degree of wear, may have a difference of 25 per cent in reserve strength. The principal reason for this variation is the difference in the service in which the ropes may have been used. One rope may have been subjected to excessive acceleration stresses, causing considerable loss of strength due to the fatigue of the steel, while the other rope may have operated under more uniform tension with no over-stress. Another factor is the relative amount and efficiency of the lubrication, upon which depends the degree of corrosion of the strands, a condition which is not always visible.

Wire ropes used for cranes and electric or pneumatic hoists should be discarded when there are four or more broken wires in any one strand; when the outer wires have been worn to two-thirds of their original diameter, or when the loss of area exceeds 15 per cent for the combined wear and broken wires. When inspecting crane and other hoist ropes it is always advisable to examine those sections of the rope passing over the equalizing or compensating sheaves as there is a slight movement of the rope over these sheaves, which sometimes causes abrasion or broken wires and thus introduces dangerous conditions.

When employed for elevators or skip hoists the wire rope should be discarded when there are more than three adjacent broken wires in any one strand; when the outer wires have been worn to two-thirds their original diameter, or when marked corrosion appears. The U. S. Bureau of Mines, in Technical Paper No. 237, advocates that shaft ropes which have been in place for three years, even if idle, shall not be used unless tested for ultimate strength. Indeed, any rope that has remained idle for some time should be tested by cutting off and examining the interior wires for possible corrosion and wear. The factor of safety for a deteriorated rope in this class of service should not be less than four.

For boom lift, fall and hoisting lines on derricks, the ropes should be discarded when six or more adjacent wires are broken in any one strand or when the outer wires have been worn to one-half their original diameter. Holding, closing and boom lines on locomotive cranes should be discarded in conformity with the rules given for derrick ropes and when an examination of the ropes is made attention should be given to that part of the rope passing over equalizing sheaves for the reasons set forth.

Seven Roads Announce Awards

Follow Practices of Previous Years in Determining Ratings of the Various Divisions, Districts and Sections

SUPPLEMENTING the results of annual track inspections on two railways reported in the December issue, we present below a review of reports made by seven other roads made available during the past three weeks. These roads are the Pere Marquette, the Long Island, the Lehigh Valley, the Chesapeake & Ohio, the Southern, the Richmond, Fredericksburg & Potomac and the Canadian Pacific.

Awards on the Pere Marquette

The Toledo-Ludington division of the Pere Marquette, of which H. J. Bogardus is divison engineer, received the highest rating in the annual track inspection. This division also had the high rating in 1926. A supervisor's district of this division, namely that of William O'Brien, Toledo, Ohio, received the highest rating of all subdivisions on the road, and Mr. O'Brien was accordingly awarded the supervisor's prize of $100. Mr. O'Brien's sub-division also showed the greatest gain in rating over last year, but in conformity with a rule which prohibits the giving of the prizes for both highest grade and greatest improvement to the same individual, the improvement prize was awarded to A. Larson, supervisor on the Chicago-Petoskey division, with headquarters at Grand Rapids, Mich. In addition to the above, prizes of $25 each were given to foremen on each of the 15 supervisors' divisions whose sections received the highest grade and also to the foreman on each district whose section showed the greatest improvement over last year.

Lehigh Valley Announces Ratings

The Lehigh Valley does not make cash awards to its section foremen and supervisors for excellence in the condition of their territories throughout the year, as it finds that it can obtain the desired results of good track, and at the same time maintain the interest of its men, by carefully determining the relative condition of each division and subdivision and then publishing the results. In establishing the ratings given, each class of maintenance work is rated independently, the maximum percentage attainable for each class of work being as follows: 35 per cent for surface, 25 per cent for line, and 6 per cent for ties, joints and anti-creepers, ballast, drainage, and general appearance.

On this basis the 1927 annual inspection resulted in the Seneca division, R. E. Patterson, division engineer, receiving the highest rating, 99.29 per cent. The Wyoming divisoin, F. N. Loughnan, division engineer, received the second highest standing with a rating of 99.28 per cent, while the third highest rating, 99.23 per cent, went to the Buffalo division, E. J. Cullen, division engineer.

In the results by sub-divisions, the territory of E. F. Dinan, supervisor on the New Jersey and Lehigh division, received the highest rating of 99.42 per cent; that of J. A. Murphy, supervisor on the Seneca division, received the second highest rating for the second consecutive year, 99.41 per cent; and the track of H. F. Reilly, supervisor on the Wyoming division, was given the third highest standing with 99.41 per cent, the same rating received by Mr. Murphy. The average rating for the entire road was 99.25 per cent, as compared with the average rating of 99.23 per cent in 1926.

Sixty-four Prizes on the Canadian Pacific

For the fifteenth consecutive year the Canadian Pacific, Eastern lines, continued in 1927 its practice of making annual track awards, and as a result, 64 foremen were given prizes ranging from $100 to $10 each. These prizes consisted of a general manager's prize of $100, four general superintendents' prizes of $50 each, 14 division superintendents' prizes of $25 each, and 45 roadmasters' prizes of $10 each. In each case the prizes were awarded on the basis of the amount of work accomplished throughout the year and the economy with which it was effected, taking into account all classes of track maintenance work and the varying physical conditions prevailing on each section. In no case were the prizes awarded solely on the general condition and appearance of the sections at the end of the year.

In judging the winners of the various prizes on the Canadian Pacific's Eastern lines, a winning section is first selected on each of the 45 roadmasters' territories, and from these are picked the winners of the superintendents' prizes. The winners of the general superintendents' prizes are then selected from the winners of the superintendents' prizes, and finally the general manager's prize is awarded to one of the winners of the general superintendents' prizes. In each instance, the winner of one of the larger prizes is excluded from accepting the award accompanying the smaller prizes.

For the year just past, the general manager's prize was awarded to M. Cetchuk, Naiscoot, Ont., of the Sudbury division, Algoma district, while the next four highest prizes, awarded by general superintendents, were won by the following foremen: J. Mack, McAdam, N. B., Mattawamkeag sub-division, Brownville division; H. Brisebois, Piedmont, Que., Ste. Agathe sub-division, Laurentian division; W. Wismer, Campbellville, Ont., Galt sub-division, London division; and P. Sparkes, Pays Plat, Ont., Nipigon sub-division, Schreiber division.

Long Island Awards

Following its usual practice of bi-monthly track inspection by a special track inspection committee, the Long Island awarded a total of $1,150 in cash prizes to its supervisors and foremen who have maintained their territories in the best physical condition during the past year. For the third consecutive year, R. L. Haring, supervisor, Division No. 3, with headquarters at Jamaica, L. I., won the first prize of $200. The second prize of $100, awarded on this same basis, was won for the second consecutive year by W. M. Steers, supervisor, Division No. 5, with headquarters at Hicksville, L. I. The third highest prize,

which is a special award of $100 for the division having shown the greatest improvement in general track conditions during the year, was won by K. M. Hammann, supervisor, Division No. 3, with headquarters at Jamaica. In addition to these three prizes awarded to supervisors, five prizes of $100 and five of $50 were awarded to section foremen.

In making the awards, the judgment of the inspection committee was, as in 1926, supplemented by the records of an instrument designed to record all vibrations induced by irregularities in the surface or alinement of the track.

Southern Awards $2,090 and 34 Motor Cars

One hundred and seventy-three foremen in the track and bridge and building departments of the Southern, lines east, were awarded prizes during the past year for general excellence in maintaining their sections Of this number, 34 received motor cars, 70 received $20 gold pieces and 69 received $10 gold pieces. As in past years the first prize award was a motor car, but if a first prize winner had a car he received $20 in gold and the car was given to the second prize winner on his territory, unless he also had a car, in which case it was given to the third prize winner, the second prize winner receiving $10 in gold.

For some years in the past, the Southern has been very thorough in its annual track inspection, definitely grading each class of maintenance work and thereby establishing a rating for each unit of the system, from the individual section foreman's territory up through the various districts. This year, owing to the pressure of other work, the grades were not marked for all divisions, and the prize winners were selected by the roadmasters and engineers maintenance of way from their knowledge of existing conditions.

C. & O. Makes Thorough Inspection

In the Chesapeake & Ohio's annual track inspection to determine the winners of the annual track awards made by that road, the engineer maintenance of way, superintendents, division engineers, general track inspectors, and track supervisors took part. A special train was used, consisting of office cars, two standard Pullman sleepers, a dining car, a special observation car with elevated seats and the Erie Railroad's inspection car, which is fitted with special equipment for recording graphically low joints, gage and cross level.

For rating the record obtained through this latter equipment, a special system of grading has been worked out in which demerits are given for low joints and irregularities in surface. For each ⅜-in. low joint one demerit is given, and for each joint ⅝ in. low, or lower, two demerits are given. Supplementing the graphic record, a special committee, composed of the general track inspectors and division engineers, graded each section of the road on its general appearance, penalizing with demerits in accordance with fixed rules for irregularities. In the final ratings, the committee's markings are given a weighted average of 40, while the records of the Erie's inspection car are given a weighted average of 60.

In carrying out the inspection on the C. & O., the entire system was divided into the four following classes or sub-divisions, according to the character of the track and the class of traffic handled: Group I—double-track main line, freight and passenger traffic; Group II—single-track main line, principally pasenger traffic; Group III—principal branch lines, single or double track, mainly freight traffic; and Group V—secondary branch lines. In each of these classes a first and a second prize were awarded to the supervisors whose sub-divisions received the highest weighted average, and in addition, first and second prizes were also awarded to the foremen on the first and second best maintained sections on each supervisors sub-division, grading for these prizes being similar to that for the supervisors' prizes.

In addition a prize was also given to the sub-division on the system showing the most improvement during the year, this prize being based solely upon a comparison of graphs made by the Erie's inspection car, with the graphs of the previous year.

The results of this year's inspection were as follows:

Group I—First, Huntington sub-division, J. L. Brightwell, supervisor; second, Charleston sub-division, A. Henzman, supervisor.

Group II—First, Mountain sub-division, R. H. Gibson, supervisor; second, Chicago sub-division, S. Ryan, supervisor.

Group III—First, James River sub-division, J. F. Painter, supervisor; second, Rivanna sub-division, L. D. Burdette, supervisor.

Group IV—First, Whitesville sub-division, B. Jackson, supervisor; second, Greenbrier sub-division, E. G. Holzapple, supervisor.

The system improvement prize for 1927 was awarded to J. L. Brightwell, supervisor of the Huntington sub-division, who also won the first prize of the general inspection for Group I.

$360 is Awarded on the R. F. & P.

Following its annual track inspection, the Richmond, Fredericksburg & Potomac makes a practice of awarding two sets of four prizes, the first being based on the general condition of the various sections of the road as rated by the inspection judges, and the second being based on the cost of maintenance. The four prizes in each set of awards are $100, $80, 60 and $40, respectively.

As a result of the 1927 inspection the first prize on the basis of general maintenance was awarded to Ernest Rogers, section foreman in the Potomac yard at St. Asaph, Va.; the second prize was awarded to J. S. Carpenter, section foreman at Fredericksburg, Va.; the third prize to G. Money, section foreman at Quantico, Va.; and the fourth prize to W. H. Sisson, section foreman at Alexandria, Va. The section foremen winning the four highest prizes on the basis of the cost of maintenance were, in the order named, as follows: B. J. Toombs, at Milford, Va.; L. T. Surles, at Fredericksburg, Va.; A. B. Cox, at Guinea, Va.; and R. M. Lowry, at Wide Water, Va.

Union Pacific Passenger Station, Parco, Wyo.

Widen Cut Without Obstructing the Track

WHILE the use of mechanical facilities for ditching or the widening of cuts is commonly associated with the use of an operated track it has been found possible under certain favorable conditions to employ power equipment which does not occupy a track and introduces no interference with revenue trains. An illustration of this is afforded in the use of a portable crane equipped with a drag-line bucket to widen one side of a cut for a distance of 1,050 ft. on one of the eastern railroads.

As seen in the photograph the location is on a side hill with a cut slope from 6 to 8 ft. deep on the uphill side. The toe of this slope was so close to the roadbed as to make the ditch entirely inadequate. Traffic conditions were such that it was deemed inadvisable to use either a spreader or a shovel type ditcher. The ground at the top of the slope was fairly level and there was adequate space between the top of the slope and the right of way line to permit the wasting of the material that would be excavated in widening the cut about 3 ft. The disposal of the material in this way also offered the advantage that the waste bank would form a berm that would serve as a barrier to keep surface water from washing down the slope.

The crane used for this purpose was equipped with a 28-ft. boom and a ½ yd. drag-line bucket. It was mounted on a five-ton Mack truck which was equipped with a motor truck crawler. This rig has eight fully rubber-tired wheels for road travel but can be converted in 10 or 15 min. to provide a full crawler tread for the rear and for travel over soft ground, ditches, mud-holes, etc.

For this particular piece of work it was necessary to drive the machine about three miles over an old road, using the eight rubber-tired wheels. At a point on this road opposite the site of the work the crawlers were attached and the unit driven over a very soft field for a distance of about one-half mile. It was then backed into place at one end of the cut.

Operated in this position, as shown in the photograph, the machine widened the cut three ft., and built the berm for the entire distance of 1,150 ft. in 10 working hours. It was then removed from the work in the same way as it was driven in. As no part of the machine at any time fouled the track it was unnecessary to make any provision for flagging or for slow orders during the time that the work was in progress. The cost of the work totaled approximately $30 to $40 including labor, fuel and oil, and depreciation and maintenance.

While the crane was used on this particular piece of work with a drag-line bucket, it is equally adapted to work requiring the employment of a clam-shell bucket, a shovel attachment, a lifting magnet, or other hoisting equipment. The crane can also be employed on other mountings, such as a flat car, a full crawler tread, etc. It is manufactured by the Universal Crane Company, Cleveland, Ohio.

Widening a Cut From the Top of a Slope

The Hull-Rust-Mahoning Open Pit Mine near Hibbing, Minn.

The largest open pit mine in the world, with a length of 1¼ miles, a width of ½ mile to 1 mile and a maximum depth of 275 ft. From this mine 46,102,000 yd. of overburden and 131,952,634 tons of ore have been removed since it was first opened in 1895. The pit contains 43 miles of tracks.

What's the Answer?

What Our Readers Have to Say on Current Questions That Perplex Those Engaged in Maintaining Tracks, Structures and Water Supply Facilities

QUESTIONS TO BE ANSWERED IN THE MARCH ISSUE

1. *Are the savings to be gained by designing switch points of such length that they can be cut from 39-ft. rails without waste great enough to overcome the extra expense which the change of standards would involve?*
2. *What is the smallest amount of concrete which will warrant the use of a mixer?*
3. *What is the most effective means of inducing uniform frost action in the ballast? Will this method have any effect on the uniformity of frost action in the subgrade?*
4. *What is the best type of door for engine house stalls, from the standpoint of maintenance?*
5. *When making a general raise of track on new ballast, is there any advantage in making the second lift with an augmented section gang rather than with an extra gang?*
6. *When it is desired to reduce the volume of discharge of a centrifugal pump for any length of time, how should this be done? How will the operation of the pump be affected if the discharge pipe is constricted to accomplish the purpose?*
7. *Is there any advantage in always selecting certain men in an extra gang for certain kinds of work? What disadvantages may result from this practice?*
8. *What interval, if any, should elapse between the creosote treatment of a pile and its use in a trestle?*

Removing Flanger Signs in Summer

Should flanger signs be left in place permanently or should they be installed each autumn? If the latter method is preferred, what is the best type of post to use?

They Should Be Removed Each Spring

By Engineer Maintenance of Way

Whether flanger signs should be left in place permanently or installed each fall and removed each spring depends on the extent to which labor saving devices such as spreaders or track mowers are used. With such machines, signs on the shoulder of the roadbed cause considerable delay and extra labor when they are encountered, and for this reason such signs should be kept to a minimum during the season when most of the maintenance work is carried on. The removal of flanger signs in the spring is a step in this direction.

Where the signs are to be installed each season, they should be made of metal and of such design that the labor of installing and removing them each season will be kept at a minimum. In addition metal signs require less space for storage and resist damage due to frequent handling better than signs made of other materials.

They Should Be in Place Only During the Winter

By Division Engineer

While certain signs are essential to the safe and efficient operation of railroads the tendency usually is to use too many signs which are of little real value and which detract greatly from the appearance of the roadway. There is no question as to the need of flanger signs during the winter but their period of usefulness lasts only three or four months in the year. Aside from this, during the summer months, when they are not needed, they form just so many more obstructions to track mowers, spreaders and other labor saving machines which are coming into general use on the track and roadbed.

For these reasons, these signs should be removed in the spring and installed again in the fall, since the delays occasioned to the operation of labor saving equipment will amount to more than the cost of removing and reinstalling the signs. When this procedure is followed the signs should be made preferably of metal and of a design which will permit them to be set in place and removed cheaply.

Overcoming Trouble with Packing for Pumps Handling Muddy Water

When handling muddy water, what precautions should be taken with the packing glands of triplex or other plunger pumps to prevent leakage past scored plungers without overloading the power unit?

The Packing Should Be Pliable

By J. P. Hanley
Water Service Inspector, Illinois Central, Chicago

In pumping muddy or gritty water with triplex or other outside packed pumps it is difficult to prevent scoring of the parts but much can be accomplished by installing intake sumps of such design and size as will

permit some settling of water before it enters the pump. On the Illinois Central, where muddy or gritty water is to be handled, we use a concrete intake sump of ample size, divided into two chambers. The muddy water enters the first chamber, which has screens and some settlement space below the intake pipe. From this chamber the water enters the suction chamber through screens and the suction pipe is provided with a screened foot valve or a screen near the pump. In this way a considerable amount of grit is prevented from entering the pump itself.

Aside from these precautions a good grade of packing maintained in a pliable and well lubricated condition will be the most helpful. It is a common mistake to tighten the packing glands too much when leakage occurs. The packing should be removed and softened by grease or graphite and the box replaced, instead of tightening up on the hard packing, which usually only aggravates the trouble. With centrifugal pumps, bearing troubles due to gritty water may be overcome by lubricating the packing by grease cups instead of water lubrication, or by the use of clear water from another source if it is desired to maintain the water lubrication.

When purchasing pumps for handling muddy water the manufacturer should be advised so that any desired devices to mitigate this trouble may be applied before the pump is installed.

A Little Leakage Will Reduce Scoring

By J. R. Hickox

Hydraulic Engineer, Chicago, Burlington & Quincy, Chicago

It is difficult to prevent the leakage of water past scored plungers but in pumps which must handle muddy water much of the scoring of plungers may be prevented by allowing a small amount of leakage past the packing to furnish a water lubrication. Tight packing in such cases not only adds the load on the power unit but also increases scoring, since particules of grit will work into the packing and form hard spots which score the plunger rapidly. While this method is not particularly neat it can be easily taken care of since the amount of water involved is small. This method is used extensively in the mines in the Black Hills in South Dakota, where the water contains a large amount of grit.

Scalping Weeds and Grass from the Shoulders of the Roadbed

What advantage, if any, is gained by scalping weeds and grass off the subgrade from the ballast line to the edge of roadbed on fills or to the back line of ditches in cuts?

This Practice Is a Material Aid to Drainage

By J. V. Daniel

Supervisor of Track, Baltimore & Ohio, Weston, W. Va.

Weeds, grass, leaves, or other obstructions should never be allowed to remain in the ditch along the track. The sub-grade and ditches should be scalped and cleaned thoroughly every fall just before winter after all general track work has been completed and the leaves have fallen, so that during the winter and spring rains or while snow is melting the water may flow off without injury to the track.

The advantages gained by providing a clear passage for water and not allowing it to accumulate in the track or adjacent thereto are many. If water is permitted to stand in the ditches or on the shoulders of the roadbed it will only be a short time until it finds its way to a place underneath the track. The ties will soon begin to churn and in a few days pumping joints will show up which, if not corrected at once, will prove destructive and rough riding track will result. The bad effects of pumping joints are almost too numerous to mention. A few of the more important are increased rail, spike, bolt and angle bar wear; injury to ties, roadbed, displacement of ballast, and rail creeping, which is least prevalent where the track is full of ballast and well drained.

Scalping Aids Drainage and Improves Appearances

By W. C. Vandiver

Supervisor, Louisville & Nashville, La Grange, Ky.

Scalping the grass and weeds off the sub-grade improves the drainage of the track and also the appearance of the roadbed. It also provides a clean place to work when filling in track after surfacing. On this account it speeds up the work and the ballast is cleaner when it is shoveled into the track.

Care must be taken not to scalp too deeply and thus cut away the embankment, and in ditches the backs should be scalped only as high as the water rises on the slope. If the work is properly done the advantages of better drainage, cleaner ballast and better looking track will more than offset the cost of scalping.

Cleaning Downspouts That Are Clogged with Ice

What is the best method of cleaning out downspouts which have become clogged with ice?

Salt or Calcium Carbide Should Be Used

By Assistant Engineer of Buildings

Salt or calcium carbide should be used as a thawing agent when a downspout becomes clogged with ice, since the use of steam or hot water for this purpose is apt to burst the pipe. This process is slow and tedious at best and it is our practice to eliminate the danger of the clogging of the downspouts on our larger structures by placing them inside the buildings where they will be protected from the cold. When this is done, cast iron pipe is used, with the joints carefully sealed to prevent leaking, and conductor heads are used where the downspouts join the gutter to prevent snow and ice being carried into the pipes. We have little trouble with clogged downspouts on our smaller buildings, such as ordinary stations, etc., and outside downspouts are used in such cases.

Provisions Should Be Made for Steam Pipes

By Division Engineer

The damage resulting from downspouts which have become clogged with ice makes it important to avoid such a condition to as great an extent as possible, and to have the means of thawing them out readily available when needed. In selecting the downspouts for buildings in northern climates they should be of ample size so that they will not become clogged with small pieces of snow, ice, or other matter carried in from the gutters. Care should also be taken to furnish a cross section which will not become closed in a short time by the gradual accretion of ice on the inside surface of the pipe. In localities where freezing weather is common, this is more important than the carrying capacity of the pipe and calls for a much larger pipe than would be required for conducting the water from the roof area in warm weather.

The clogging of the larger pipes is usually due to

the gradual accumulation of ice on the inside of the pipe and is most prevalent when the daily variation of the temperature ranges from a little above freezing to considerably below. The temperature of the water entering the pipe under these conditions is only slightly above 32 deg. and with the drop of temperature at night the moisture in the pipes will congeal wherever the pipes are exposed to the cold. When thawing takes place the next day the water entering the pipe is at too low a temperature to melt this film of ice, with the result that it gradually thickens and eventually clogs the pipe. When this occurs about the only thing to do is to use steam to thaw the ice and unless some provision has been made to introduce a steam pipe near the bottom of the downspout this is a slow and expensive operation.

The writer recalls an instance where the downspouts on an important terminal station became clogged with ice and it was necessary to insert a Y near the bottom of the downspout, which permitted a steam pipe to be extended upward as the thawing progressed. The installation of these Y's at the time the downspouts are placed requires only a small expenditure and they are well worth while as a measure of insurance.

Lining Curves on Grades

When lining curves on steep grades where the rail is tight and inclined to kick out, does it make any difference whether the work is carried up the grade or in the opposite direction?

It Depends on the Direction of Traffic

By R. Rossi

Supervisor of Construction, Chicago & Western Indiana, Chicago

The answer to this question depends on the direction of traffic, the amount of throw and whether the curve is to be lined in or out, as well as the length of the curve. In lining curves inward, on grades, I make it the practice to open up a space of three or four inches at the lower end of the curve, if the traffic permits. I also keep on hand two switch points and a few extra rails from six inches to two feet shorter than the standard rails, to be used in making closures or in case the track buckles. In lining, I always work up grade on the first throw and after that I carry the work either way, depending on the way the expansion is distributed.

When lining curves outward, with the traffic down grade, I always line up grade twice and down grade once, repeating in this order as often as is necessary to get the proper line and uniform expansion. After the lining is completed, the anti-creepers should be reapplied to maintain the proper expansion.

Depends on the Direction of Creeping

By Roadmaster

In lining curves on grades the decision as to carrying the work up the grade or in the opposite direction hinges on the direction in which the rail has a tendency to creep and the extent to which rail anchors are used. It is true that creeping on grades is usually down hill but this is not always the case, hence the question as to the direction in which the work should proceed depends upon the same factors as on level track, and this is determined by the direction of creepage.

Where the rail is tight and the curve is to be lined in, the first throw of the track should begin at the end of the curve towards which the rail is creeping. If there is danger of the track kicking out, additional expansion should be provided for by the use of short rails or switch points. The latter practice involves a certain amount of danger to traffic and is prohibited on many roads on this account. Where it is permitted it should always be done under flag protection and trains allowed to proceed only at low speed.

When the curve is to be lined out there is little danger of the track kicking out except when it is first disturbed. Where the rail is so tight that this may occur additional expansion should be provided by the use of short rails and the bolts in the joints loosened so that the expansion may have an opportunity to adjust itself.

While the lining is in progress the work must be carried in either direction necessary so that the expansion will be uniform when the track is in the proper position.

Nosings for Bridge Piers

What are the relative merits of steel rails and angle irons as nosings for bridge piers?

Rails Have Proven Satisfactory

By W. R. Roof

Bridge Engineer, Chicago Great Western, Chicago

Concrete bridge piers in streams should be protected with metal nose irons, where there is a considerable movement of ice or heavy driftwood, or where there is navigation. By doing so, the life of the pier is lengthened materially and the pleasing appearance of straight masonry lines is maintained.

On the Chicago Great Western every concrete pier located in a waterway is protected by straight pieces of second hand rail. The form work for the concrete is made in the usual way and the rail is placed, base out, at the intersection of the upstream faces, extending from the footing course to the bridge seat. The rail is anchored to the concrete with ¾-in. U-shaped round bars which pass through holes drilled in the web of the rail at intervals of about three feet. The use of rails with the base out is better than angle irons since the rails fit any angle of pier nose and require no change in the form work. The rail also lends itself better to anchorage with the concrete.

I have never seen a complete failure of these nose irons, although we found a partial failure in a pier of the Mississippi River bridge at St. Paul, caused by a collision of a boat which struck the nose a glancing blow.

Special Angles Usually Have Better Appearance

By Bridge Engineer

Metal nosings for bridge piers to prevent damage to the masonry of the cutwater from floating ice or drift have assumed greater importance since concrete has been used so extensively than when it was the almost universal custom to build the piers of cut stone. The nosing used should preferably be made of material that requires little fabrication to fit it for its use; should fit the forms with the least amount of adjustment; should be capable of being anchored to the concrete and should be reasonably low in cost.

The ordinary angle iron fulfills all these requirements except as to fitting the forms, since the 90-deg. angle does not lend itself to a desirable shape for the nose of a pier. The iron can be heated and bent to any desired angle, but where the cost is an important factor this is not desirable, since it involves extra expense. The angles can be anchored to the concrete by hook bolts

passing through holes drilled in the flanges, the bolts being inserted before the angles are fitted into the forms so that they become embedded in the concrete as it is deposited.

Rails have the advantage that they are always available at a small cost on railroads and require little extra work to enable them to be used as nosing. The form of the rail is such that it bonds well with the concrete and if additional anchorage is desired it may be obtained easily by passing rods through holes drilled in the web of the rail and bending them back to be embedded in the concrete.

In spite of the low cost of rails for this purpose, some of the larger roads use specially designed nosings, feeling that the better appearance gained by their use is worth the added expense. These nosings usually consist of plates of ⅜-in. metal bent to an angle to fit the forms, with anchor lugs of Z-section riveted to the nosing with the rivets counter-sunk on the exposed faces. The width of the plate on each side of the nose ranges from 8 to 10 in. and the anchor lugs are spaced about 3 ft. apart. These nosings may be made in any convenient lengths and present a good appearance in the finished work, while the extra cost is a small proportion of the entire cost of the pier.

Installing Tie Plates with New Rail

When new tie plates are installed at the time of laying new rail, what measures should be taken to insure that the gage will be correct when the plates have become embedded in the ties?

The Rail Seat Must Be Level

By C. W. Baldridge

Assistant Engineer, Atchison, Topeka & Santa Fe, Chicago

If the tie plates which are being removed have ribbed or otherwise roughened or irregular shaped bottoms, a check of the new plates should be made to see that corresponding ribs or projections do not fall just far enough inside or outside of the depressions made in the ties by the old plates, to cause the new plates to settle into the old depressions. If such conditions are found, the tie plate beds should be adzed just enough to eliminate the old depressions. If the ties are plate cut, a new tie plate bed should be prepared to a proper face by adzing.

After the tie plate beds are properly prepared, the new plates should be placed and the new rails set upon them. Before driving any spikes on either side of the new rail, one should make sure that the base of the rail does not rest upon the shoulder of any tie plate, or upon anything that will tip the rail either inward or outward.

If the outer edge of a rail base rests upon the shoulder of even a single tie plate, the rail will be tipped inward. If spiked in this canted position, even with the most careful use of the gage, the rail will show wide gage when the plate is moved out to its correct position and the rail straightens up. The gage will be tight if the rail is spiked down while tipped outward and then allowed to straighten up by the removal of whatever held it in the tipped position.

If the tie bed is prepared correctly and care is taken that the rail is in the proper plane before any spiking is done, and if the bottom of the tie plate is correctly designed, the track will remain in proper gage if the rails are spiked to that gage. A large amount of the widening of the gage of track shortly after the rail is laid is due to the rail being tipped inward by the outside edge of the base of the rail resting on the shoulder of a tie plate while all or a part of the rail is being spiked down.

Proper Adzing of the Ties Is Essential

By E. P. Safford

Supervisor of Track, New York Central, Silver Creek, N. Y.

Proper adzing of the ties is the foundation on which to build perfect gage when the tie plates have settled into place. As soon as the year's rail program has been decided upon, the track supervisor should check up the adzing necessary for each location scheduled to be relaid. Scoring and adzing may frequently be done during the late fall and winter before rail laying is started. It is always preferable to have this done where practicable by regular section men, rather than to trust to seasonal extra gang men.

The old rail may be in true level on the ties—it may be tipped out or in slightly. This may best be tested by running a straight edge across the track under both rails. In using canted tie plates it is essential that the ties be adzed to the same plane for both rails. The notching in on every tie must be far enough from the rail flange so that the slope of the cutting will clear the end of the tie plate fully one inch. This is vital. If true level is not obtained for the full base of the tie plate, the plate will settle to cant out or in, or swing over an opening and settle irregularly and the gage will not be uniform; neither will the rail afford a full bearing for the wheels.

After this preliminary scoring the chips are cut out up to the spikes and the rail flange, and the adzed portions painted with creosote oil. If the old rail lies to true level little additional adzing will be necessary when the rail is laid. After the old rail is removed and the tie plugs placed, the men cutting them off will do any further adzing to take out the cant. This adzing is again followed up with creosote oil.

In laying fully plated new rail, I find it to be the best practice to pin down a spike near each end and the middle of the rail to gage when the first side of the track is laid and then to spike the balance of this rail to line, making sure the spikes are driven straight down. This insures true line on this rail and it does not follow the joint kinks of the opposite rail. One man should be ahead, making sure that all tie plates are knocked out far enough so that the rail does not rest on any shoulders while it is being spiked. When the opposite track rail is laid it should be spiked to gage on every second tie. Two men should never be permitted to spike together on the same tie end, as such spiking is generally inefficient.

The first train passing over the new rail should be brought down by flag to a slow speed to prevent the rail being crowded out before the plates have become embedded. A train should always pass over the first side laid if possible before the other side is laid. The driving down of the spikes should be followed up promptly as the plates are settled.

Use of a Base Gage Is Recommended

By R. E. Keough

American Fork & Hoe Company, Chicago

While all maintenance men appreciate tie plates and are perhaps reluctant to complain of poor gage after the rails and plates have settled to place, it is, nevertheless, often difficult to obtain the proper gage when new rail is laid in conjunction with the application of new tie plates. It is also found that this difficulty is increased as the cant or bevel of the tie plate increases and that

variations in gage are more apt to occur with the higher sections of rail with comparatively narrow bases. It does not seem reasonable that good gage may be had by measuring the gage between the heads of the rails and then fastening the rails at their bases. Base gages have been used to overcome this trouble and such gages are now furnished as special rail gang tools on the Canadian Pacific.

Illumination for Emergency Bridge Work at Night

What is the best method of illumination for emergency work at night, such as driving temporary trestles at washouts?

Both Carbide Torches and Electric Lights Valuable

By Bridge Engineer

The methods best adapted for the illumination of emergency work at night vary with the kind of work to be done, the opportunity for placing the lights to the best advantage and whether general or localized illumination is necessary. For general illumination the familiar carbide torch, or similar devices, furnish a convenient, simple and efficient means of lighting. On some work, however, such as that around bridges where these lights cannot be placed to cast the light where needed, electric lights operated by current from a generator on a piledriver or crane, or by a portable generator of the type used to supply current for portable tools may be used to good advantage. The latter type of generator is preferable since with it the lights may be maintained continuously, regardless of the shifting of the driver or crane. By the use of armored cables the danger of short circuits or of injury to the workmen is avoided, and the lights may be placed where needed, furnishing an illumination which is without glare and does not cast deep shadows. In many cases both methods may be used with good results on the same work.

Prefers Carbide Torches or Electric Lights

By C. R. Knowles
Superintendent of Water Service, Illinois Central, Chicago

Various methods are used for night illumination for emegency work such as clearing wrecks, combatting floods and other similar work, ranging from a bonfire built along the right-of-way to portable electric lighting outfits. Carbic or carbide lights in which a gas is formed by water and carbide are the most commonly used. The advantage of these lights is that they are constantly ready for use, safe in operation, give a brilliant light and are easily carried, as each light is self-contained and is a separate unit. The carbide is furnished either in bulk or in cakes. The cakes are used quite extensively as there is practically no waste and less ash than with the bulk carbide.

A simpler form of the carbide light used extensively in emergency work is what is commonly called a marine light, and consists simply of a can of carbide about 5 or 6 in. in diameter and some 18 in. long. This can is placed in a bucket of water and the gas ignited, each can furnishing light for about two hours. When exhausted it cannot be used again. The advantage of the marine light is that it is convenient, and is easily portable as each light only weighs a few pounds. The disadvantage is that it is more expensive than any other form of carbide light. Portable gasoline lights have been used to some extent in the past but on account of the danger connected with their use they have been replaced by other safer methods.

Electricity has become an important factor in emergency lighting. In many cases electric power and light circuits are available for emergency use simply by constructing a temporary line. In other cases portable electric generator sets are installed. These generator sets are usually self-contained and driven by gasoline engines, and where the demand for light is sufficient to justify the expense for an outfit of this kind it proves a very efficient and economical installation. The outfit can be readily placed upon flat cars.

An example of these portable electric light outfits was offered in the recent Mississippi River flood. One railroad used outfits of this kind in driving bridges at night through water which was four feet over the rail in many cases. The portable outfits were installed on rafts and floated to position as required. The extension cords permitted lights being placed both on the drivers and at temporary points along the right-of-way. The same railroad strung temporary lines to provide illumination for filling sand bags at several points. Carbide lights, both portable lights and marine, were also used extensively throughout the flood.

Precautions to Be Taken When Driving Piles in Frozen Ground

A further answer to the following question discussed in the December issue:

What, if any, precautions should be taken when driving piles in frozen ground?

Jack Hammers Will Make Holes Through Frost Cheaply

By E. M. McCabe
Supervisor of Bridges and Buildings, Boston & Albany, Pittsfield, Mass.

In driving piles in frozen ground, holes should be made to receive the piles and for this purpose large savings can be made by using jack hammers with pointed and chisel bars where a portable compressor is available to supply the air. The holes should be large enough to clear the piles, as otherwise there will be severe shocks to the leads and braces if a heavy hammer is used. I am not in favor of either cast iron or steel points as it has been my experience that they usually crush up into the pile and damage it more than if the points were not used.

Annual Dinner of the Big Four Track Foremen and their Families

New and Improved Devices

Apply Protective Coating to Pneumatic Tube System

FOR THE purpose of protecting about 5,500 ft. of 4-in. steel tubing, forming a part of the pneumatic tube system in the Markham yards of the Illinois Central at Chicago, against corrosive action of the soil or other destructive agencies, the line has been treated inside and out with a chemically compounded rust preventive known as No-ox-id and wrapped with fabric treated with the same material. This line of tubing is laid four feet under the surface of a fill containing lake sand, foundry refuse and clay, with cinders and granulated slag on the surface. The manner of applying the protection was as follows:

No-ox-id of the grade known as A Special, which is of a consistency such that it may be put on readily with a brush, was applied to the upper side of a section of tubing as it lay on skids. Then a sling made of a piece of heavy canvas was looped over the tube

Applying the Second Coat of No-ox-id on the Spiral Wrapped Pipe

and drawn back and forth until the coating was distributed thoroughly over the entire surface. This done, a strip of "No-ox-idized" wrapper 5½ in. wide was wrapped around the tube in spiral fashion with a 1-in. lap. This was done by having one man turn the length of tubing by means of a crank at one end, while another man holding a cut roll of the wrapper walked the length of the tube as the wrapping progressed.

Following this operation the tube received a second application, which was made exactly as the above, except that the wrapper was applied lengthwise with a longitudinal lap. The entire treatment was stopped one foot short of each end of the section to permit the application of the screw couplers that were fitted

Putting on the Straightway Lap Wrapper

over one end of each section. After the tubing was placed in the trench and connected up, it was necessary to apply the protection where it had been left off at the joints. To do this a heavy coat of the No-ox-id was then applied to the coupler and the uncovered portion of the pipe on each side and wrapped as explained above. A second coating was also put on and covered with a 20-in. by 30-in. sheet of the wrapper, applied with its longitudinal lap on the underside.

The advantage of this method of covering is that in the event that the pipe line must be disconnected at any point it is necessary only to remove the protection from the couplings without disturbing the coating on the rest of the line.

No-ox-id and No-ox-idezed wrapper are manufactured by the Dearborn Chemical Company, Chicago, and their application was carried out in accordance with standard methods recommended by that company; the double application was made because it is said to insure against electrolytic action as it is deemed important to guard against injury from this source as well as the action of the corrosive agencies in the filling material of the yard.

The inside of the tubing was treated by swabbing it with protective material of the same grade as was used on the outside. In addition to its value as a protection, the coating on the inside of the tube acts

like a lubricant that is said to increase the speed of the carriers 20 per cent.

The same form of protection was also applied to the inside of four miles of existing tubing. This was accomplished by saturating a sponge with No-ox-id that had been softened by heating and then running this sponge through the tube from end to end ahead of one of the carriers. This operation was repeated from each end of the line many times, the sponge being re-saturated as often as found necessary. The application of this treatment on the inside of the existing tube was effective in reducing the time of delivery of the carrier 1½ min. in 7 min., and since the treatment has been in place the carriers no longer bring out rust particles, as was the case before treatment.

An Improved Spray Gun

THE QUALITY of work done with paint spray equipment is influenced by the accuracy with which the jet or ribbon of atomized paint is delivered to the surface to be covered. If the fan of atomized liquid is not of uniform density throughout its width

The DeVilbiss Type AV Paint Spray Gun

the liquid will not be applied to the surface to a uniform thickness. Quality is influenced also by the readiness with which the width of the jet is adjusted. If this cannot be done quickly and easily the operator will not always use the width best suited to the character of the work.

For the purpose of raising the standards for high grade work in spray painting, the DeVilbiss Co., Toledo, Ohio, has developed a new spray gun known as the Type AV, which is said to be the result of extensive experiments and a study of the service rendered by its earlier models during the last 15 years or more. In addition to increased refinement in workmanship, involving the use of a manganese chrome steel tip that has been carburized, heat treated, and accurately ground, the new nozzle is provided with a nurled ring which is turned by the application of the thumb and finger to obtain adjustment of both the character and the width of the spray. This ring is also provided with graduations so that the operator can quickly restore the nozzle to any setting previously made for producing any desired spray. One setting of the adjustable feature results in cutting off the air supply entirely, thereby producing a round jet.

The manufacturer also states that all nozzle parts are self-centering, thereby eliminating the possibility of eccentric sprays. All parts of the nozzles are finished to accurate gages and carefully inspected so that parts are interchangeable for the purposes of repair or replacement. The gun is said to be well balanced so that it rests easily in the hand, and this feature, together with the fact that the trigger is large enough to permit the operator to use either one or two fingers, makes for easy, untiring operation.

New Corrugated Culvert Pipe Resists Erosion

AMONG the many difficult problems with which railway engineers have to contend is that of the erosion of culverts and other drainage lines. While erosion is always a factor to consider, it is an especially serious problem in the case of culverts carrying sedimentary streams and culverts placed with a steep grade. Drainage lines carrying water of a chemical nature are also subject to rapid deterioration. In all of these cases the service life of the installation is often reduced materially unless some protection is provided against erosion.

This problem of erosion has been the subject of study and research by the Armco Culvert Manufacturers' Association for a number of years. The solution developed from this study was made available to engineers in 1927 and has already been applied in

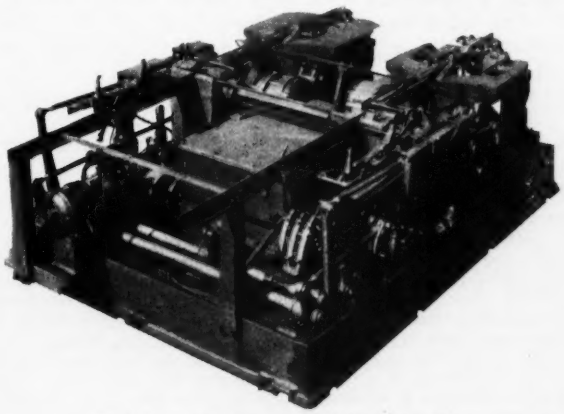
An Armco Paved-Invert Pipe

practical installations of corrugated culverts. It consists of a corrugated pipe in which a specially prepared bituminous material has been applied to the lower half of the pipe, in addition to which the corrugations at the bottom have been filled to provide a smooth, level pavement, thus protecting the most vulnerable part of the culvert against attack, and giving the structure a practically uniform life throughout. This floor not only fortifies the bottom of the culvert against wear but facilitates flow.

Pipes of this type have been installed on the Chesapeake & Ohio, near Monitor Junction, W. Va., on the Nashville, Chattanooga & St. Louis at Mullins, Tenn., and on the Pennsylvania at Truxall, Pa.

New Adzing and Boring Machine

A NEW TYPE of automatic adzing and boring machine, designed by Grant Shipley and Henry Alinder has been installed recently by the Ohio Wood Preserving Company in its timber treating plant at Orrville, Ohio. A new feature of the machine is the fact that it is fully equipped with Timken roller bearings. Also it is operated by a combination of compressed air and electric drive, during the separate adzing and boring operations both sets of clamps which are used to hold the ties being actuated by compressed air, the admission of which is controlled by cam-operated valves. These cams are driven through a gear train, which, in turn, is operated by a five hp. motor. The forward motion of the ties as they approach the knives is accomplished by a mechanism which is also actuated by cams. As a tie comes onto the machine, it is seized by a set of clamps and moved over the adzing knives which are mounted near the end of a shaft. This shaft is connected through a gear train to the armature shaft of a 20-hp. induction motor. As soon as the tie has cleared the knives the clamps are released automatically and it is moved forward by a bracketed carrier to a position where it is seized by a second pair of clamps which hold it over the drill heads. The drill heads are then lifted until the drills have penetrated the tie, when they are lowered out of the way and the tie is shoved off the machine. The boring drills, of which there may be four, five or six in each head as desired, are driven through individual



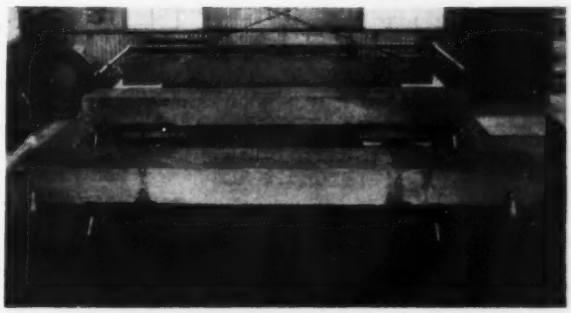
The New Adzing and Boring Machine

sets of reduction gears by a 15-hp. motor. The capacity of the machine when working at full speed is seven ties a minute.

The primary control is of the push-button variety by which the motors are thrown directly on the line. There are three push buttons on the primary board, one each for the cam-drive motor, the adzing-knife motor and the boring-head motor. A number of secondary stations are located at various points at the sides of the machine, from any one of which the cam motor can be stopped in case of emergency.

Two other unusual and interesting safety features have been incorporated in this control. An automatic contact switch, which is actuated by compressed air, is mounted on the back of the primary control panel. When closed, the contacts of this switch are in series with the push button and cam control drive motor. Consequently, if the air pressure is below that required to close the switch, the machine cannot be started, while if it falls below a predetermined pressure during operation, the contacts will open, breaking the circuit, which stops the forward motion of the ties. Again, if a drill breaks in a hole the increase in pressure in the mechanism due the broken drill compresses a spring in the cam box which, after a movement of 1/16 in., opens a switch and stops the machine.

A further feature of the machine is that the motors, which are supplied by the Allis-Chalmers Manufac-

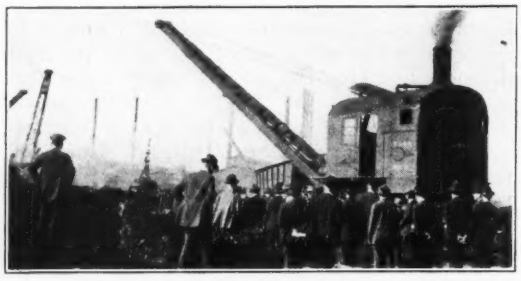


The Ties Held by Clamps in Position for Adzing and Boring

turing Company, and all drive and gear shafts, are equipped throughout with Timken tapered roller bearings, a total of 78 being used. The reason for selecting these bearings, aside from their ability to meet the loads which are imposed, was the ease with which they can be lubricated, and because lubrication need be renewed only at infrequent intervals. Owing to the construction of the machine many of the bearings are almost inaccessible, so that frequent inspection and lubrication is inconvenient and, therefore, likely to be neglected.

Heavy Side Hill Work in Double Tracking the Main Line of the Southern Pacific in Nevada

With the Associations



Maintenance of Way Club, Chicago

The meeting held on Wednesday evening, December 21, which was attended by 76 members and guests, was devoted to a service report on the quarter mile of experimental concrete roadbed built by the Pere Marquette near Detroit, Mich. The report on this construction, which has been in service for one year, was made by Paul Chipman, valuation engineer of the Pere Marquette, and is abstracted elsewhere in this issue.

Bridge and Building Association

Ten members of the Executive committee met in Chicago on December 3 to develop plans for the new year. The recommendation of the Arrangements committee that the new Hotel Statler be selected as headquarters for the next annual convention, which will be held in Boston on October 16-18, 1928, was approved. The Executive committee devoted the major portion of its meeting to the selection of the personnel of its committees, which personnel will be announced in a later issue.

Metropolitan Track Supervisors' Club

The next meeting of the Metropolitan Track Supervisors' Club will be held at 6 p. m. on Wednesday evening, January 11, in the regular dinner and meeting room of the club at the Martinique Hotel, New York City, at which time J. V. Neubert, chief engineer maintenance of way of the New York Central System, will give an illustrated talk on an important phase of maintence work. Special note should be made that the time of the meetings of the club has been changed from noon on Saturdays to Wednesday evenings.

Wood-Preservers' Association

The Nominating committee has presented the following slate for consideration by the association. President, H. R. Condon, consulting engineer, Century Wood Preserving Company, Pittsburgh, Pa.; first vice-president, H. E. Horrocks, manager, Pacific Creosoting Company, Seattle, Wash.; second vice-president, C. C. Cook, maintenance engineer, Baltimore & Ohio, Baltimore, Md.; secretary-treasurer, Galen Wood, chemist engineer, Philadelphia, Pa.; members of executive committee, R. S. Belcher, manager treating plants, Atchison, Topeka & Santa Fe, Topeka, Kan., and D. C. Jones, general superintendent, Ayer & Lord Tie Co., Chicago. The nomination of H. L. Dawson, consulting engineer, Chicago, as a second candidate for secretary-treasurer, has also been filed by members of the association.

The Roadmasters' Association

Twelve of the 15 members of the Executive committee met at Chicago on December 11 to select the personnel of committees and to transact other business of the association. The Book-Cadillac Hotel was selected as the headquarters for the next annual convention, which will be held in Detroit, Mich., on September 18-20. Plans were formulated for the prosecution of an aggressive campaign to bring the advantages of membership in the association to the attention of officers in charge of track maintenance and also to drop from the list those who, through failure to pay dues, have forfeited the right of membership.

American Railway Engineering Association

As a result of the aggressive work of the officers of the association during the year, the reports of the committees are being completed at an earlier date than has been customary of late. All but three of the reports have been delivered to Secretary Fritch in complete form. As a result, two bulletins containing the reports of eight committees were mailed to the members prior to January 1 and the third bulletin containing six additional reports is ready to mail.

Following the discussion of convention procedure at the last annual convention, a committee was appointed by the Board of Direction to consider this subject. This committee has sent a questionnaire to the membership, asking for an expression of opinion regarding various suggestions that have been received.

The Sperry transverse fissure detector, which has been built in co-operation with Rail committee, has been completed and delivered on the New York Central at Beacon, N. Y., where it is now undergoing preliminary tests in the field.

The following members have been nominated for office for the year, beginning at the conclusion of the March convention of that organization:

President: W. D. Faucette, chief engineer, Seaboard Air Line, Savannah, Ga.

Vice-President: G. D. Brooke, general manager, Chesapeake & Ohio, Richmond, Va.

Secretary: E. H. Fritch.

Treasurer: F. J. Stimson, assistant chief engineer maintenance of way, Western Region, Pennsylvania, Chicago.

Directors (three to be elected): C. W. Baldridge, assistant engineer, Atchison, Topeka & Santa Fe, Chicago; Hadley Baldwin, chief engineer, Cleveland, Cincinnati, Chicago & St. Louis, Cincinnati, Ohio; C. C. Cook, maintenance engineer, Baltimore & Ohio, Baltimore, Md.; John V. Hanna, chief engineer, Kansas City Terminal, Kansas City, Mo.; C. R. Harding, engineer of standards, Southern Pacific, San Francisco, Cal.; F. E. Morrow, assistant chief engineer, Chicago & Western Indiana, Chicago; J. A. Peabody, signal engineer, Chicago & North Western, Chicago; H. M. Stout, record engineer, Northern Pacific, St. Paul; and A. N. Talbot, professor municipal and sanitary engineering, University of Illinois, Urbana, Ill.

Members of Nominating Committee (five to be elected): R. C. Bardwell, superintendent water service, Chesapeake & Ohio, Richmond, Va.; W. A. Clark, assistant to general manager and chief engineer, Duluth & Iron Range, Duluth, Minn.; F. W. Green, vice-president, St. Louis-Southwestern, St. Louis, Mo.; T. T. Irving, chief engineer, Central Region, Canadian National Railways, Toronto; J. C. Irwin, valuation engineer, Boston & Albany, Boston, Mass.; J. B. Jenkins, valuation engineer, Baltimore & Ohio, Baltimore, Md.; Maro Johnson, assistant engineer, Illinois Central, Chicago; B. H. Mann, consulting signal engineer, Missouri Pacific, St. Louis, Mo.; C. M. McVay, division engineer, New York Central, Charleston, W. Va.; and H. L. Ripley, corporate and valuation engineer, New York, New Haven & Hartford, Boston, Mass.

Ballots will be issued to the members shortly after January 1.

The Material Market

WITH a definite stiffening of prices, a large volume of rail orders, an active market for cars and locomotives and a moderate increase in the production of steel during the month of December, the new year opens with definite assurance that the sag in industrial activities which marked the late fall and early winter months of 1927 has passed. This does not mean that anything savoring of a boom is to be expected. Market analysts forecast a moderate increase in business during the first quarter of the new year with reasonable assurance of greater activity during the second period.

Prices of track materials have experienced no change during the past month, structural steel quotations prevailing at the beginning of December were strong throughout the month, and there are now rumors of further advance of $1 per ton. The leading producer of wire and wire products has announced an advance of 5 cents per 100 lb. in the base price of wire nails with a new card of extras that represent an average increase of 25 cents per keg for the various sizes of nails. Another development during the past month is a further breaking away from the Pittsburgh base in quoting prices on structural steel. On December 8 the Bethlehem Steel Company announced that it will sell plates, shapes and bars hereafter on the basis of prices f.o.b. mills instead of Pittsburgh plus freight. This statement was accompanied by a quotation of $1.95 per 100 lb. on plates and shapes for its plants at Bethlehem, Pa., and Coatesville, and Sparrows Point, Md., and of $1.90 per 100 lb. for plates, shapes and bars at its Lackawanna, N. Y., plant. This announcement was followed by similar action on the part of other producers in competing territories.

Iron and Steel Prices Per 100 Lb.

	November		December	
	Pittsburgh	Chicago	Pittsburgh	Chicago
Track Spikes	$2.80	$2.75 to $2.80	$2.80	$2.80
Track bolts	3.80	3.80	$3.80 to 4.00	3.80
Angle bars	2.75	2.75	2.75	2.75
Tie plates, steel	2.25	2.25	2.25	2.25
Boat spikes	3.10	3.10	3.10	3.10
Plain wire	$2.35 to 2.40	2.45	2.45	2.45
Wire nails, keg	2.50	2.55 to 2.60	2.50 to 2.55	2.55 to 2.60
Barb wire, galv.	3.20	3.25	3.20 to 3.25	3.25 to 3.30
C. I. pipe, 6 in. to 12 in., ton		34.70 to 37.20		34.70 to 37.20
Plates	1.80	1.90	1.80	1.90
Shapes	1.80	1.90	1.80	1.90
Bars, soft steel	1.80	1.90	1.80	1.90
Rivets, struc.	2.75 to 3.00	2.85 to 3.10	2.75	2.85
Conc. bars, billet	1.80 to 1.90		1.80 to 1.90	
Conc. bars, rail	1.65 to 1.70	1.80	1.65 to 1.70	1.80
Rails, per gross ton, f.o.b. mills		43.00		43.00

Large Volume of Rail Orders

The outstanding feature in the iron and steel market during the month of December was the large volume of rail orders. Business placed by mills in the United States during the month totaled 470,000 gross tons, not including miscellaneous small orders of which no notice was received. The largest orders were those of the Baltimore & Ohio and the Southern Pacific for 94,000 tons each. Others included those of the Illinois Central and the Chicago, Milwaukee & St. Paul for 50,000 tons each, the Missouri Pacfic and its subsidiaries for 47,850 tons, the Chicago & North Western for 34,000 tons and the Denver & Rio Grande Western for 20,000 tons. Canadian mills are now rolling on orders aggregating in excess of 100,000 tons, including an order for 65,000 tons from the Canadian National and an order placed by the New York Central lines during December, for 11,600 tons of rails to be used on the Canadian lines of that system.

Production Increases

The production of rails has increased and is now at approximately 75 per cent of capacity. Tie plate production is also large and while the output of track accessories is still in limited volume, orders and inquiries developed during December point to an increase in production within a short time.

The scrap market has strengthened appreciably during the past month and prices are higher, as will be noted in the table on this page. Consumers contend that the advance is not warranted but the dealers are evidently in accord in the feeling that the demand will increase and they are accordingly making appreciable additions to their stocks. The railroads have been well represented in recent sales and in current offerings.

Scrap Prices Per Gross Ton at Chicago

	November	December
Relaying rail, (including angle bars)	$26.00 to $31.00	$26.00 to $31.00
Rails for rerolling	13.50 to 14.00	14.25 to 14.75
Rails less than 3 ft. long	14.50 to 15.00	14.75 to 15.25
Frogs and switches cut apart	12.75 to 13.25	13.25 to 13.75
Steel angle bars	13.25 to 13.75	13.75 to 14.25

Little Improvement in Lumber Sales

While sales of lumber throughout the country during the early part of December were larger than in the corresponding weeks of 1926, they were not sufficiently great to make an appreciable reduction in the deficiency in total sales in 1927 as compared with 1926, so that the total volume of business for 1927 will aggregate at least 11 per cent less than for the preceding year. Sales by the Southern pine mills during the early part of December were fully 15 per cent greater than for the corresponding period in 1926 but there was practically no increase in the sales on the West Coast and the general feeling of the manufacturers is one of discouragement. The current comment is that prevailing prices can go no lower because present levels do not afford an adequate return.

Southern Pine Mill Prices

	November	December
Flooring, 1x4, B and btr, flat	$37.00	$37.00
Boards, 1x8, No. 1	35.89	32.40
Dimension, 2x4, 16, No. 1, common	22.60	23.50
Dimension, 2x10, 16, No. 1, common	25.40	23.89
Dimension, 2x4, 16, No. 2, common	20.60	19.45
Dimension, 2x10, 16, No. 2, common	18.70	20.16

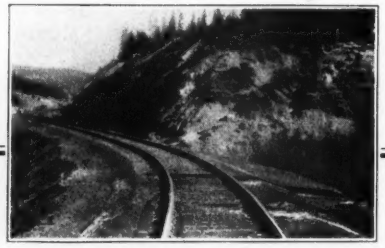
Douglas Fir Mill Prices

	November	December
Flooring, 1x4, B and btr., flat	$24.00	$24.25
Boards, 1x8, No. 1	16.00	16.25
Dimensions, 2x4, 16, No. 1, common	17.75	17.50
Dimension, 2x10, 16, No. 1, common	17.50	17.25
Dimension, 3x3 to 4x12, No. 1, common	18.50	18.50
Dimension, 5x5 to 12x12, No. 1, common rough	17.25	17.00

Prices of Portland Cement have remained unchanged except for a reduction of 25 cents at New Orleans and 9 cents at Cincinnati. The list below shows prices per barrel in carload lots not including package:

New York	$2.03	Minneapolis	$2.22
Pittsburgh	2.04	Denver	2.85
New Orleans	2.07	Dallas	2.05
Chicago	2.05	San Francisco	2.51
Cincinnati	2.23	Montreal	1.41

Railway News



Briefly Told

A substantial reduction in the narrow gage mileage of the country is being effected by the widening to standard gage of the Nevada-California-Oregon. The work has been completed from Wendel, Cal., to Alturas, 100 miles, and will be continued to include the entire road to Lakeview, Ore., a total of 155 miles.

Revenue freight car loadings for the week ending December 17 totaled 868,162, a decrease of 82,813 as compared with the corresponding week last year and of 101,576 as compared with 1925. The cumulative total to December 17, 1927, is 50,946,044, as compared with 52,537,054 and 50,523,091 for the corresponding periods in 1926 and 1925, respectively.

L. G. Bentley, chairman of the Committee on Education of the Safety Section of the American Railway Association, sent out his regular monthly circular for December in the shape of a Christmas message addressed to all railway employers and employees. The circular calls attention to the progress which has been made in the reduction of accidents and extends to all concerned sincere appreciation for "wonderful support during the year."

The Atlanta division of the Louisville & Nashville, which has 305 miles of main tracks and a total of 1,775 employees, was operated during the month of November without a single reportable injury and a similar record was made during the month of June, 1927. To commemorate this record, the employees held a general celebration at which their families were present, the total attendance being 2,500. The superintendent of the division, M. Seargeant, sent a congratulatory letter to each employee.

Five Strathcona Memorial Fellowships, provided by the will of the late Lord Strathcona, of Canada, are open each year at the Graduate School of Yale, New Haven, Conn. Applications for these fellowships, which are worth $1,000 each, will be received at any time before March 1 by the dean of the school, from whom application blanks may be obtained. The course is for college graduates and is primarily for advanced work concerning the construction, equipment and operation of railways, although students may take up any features of transportation.

The Great Northern is planning to establish a "ferry" service for automobiles through the new Cascade tunnel to assist in the solution of Washington's east and west highway problems over the Cascade mountains. Upon the completion of the tunnel, a shuttle train service will be inaugurated between Wenatchee, Wash., an the east side of the mountains, and Skykomish on the west side, a distance of 72 miles, solely for the accommodation of automobile traffic. The automobiles will be carried on flat cars, while the passengers will ride in coaches, and the night service will be so arranged that tourists retiring for the night on one side of the mountain will not be disturbed until a reasonable rising hour on the other side.

The United States District Court at St. Louis rendered a decision on December 10 in the case involving the recapture of earnings of the St. Louis & O'Fallon. In view of the nature of the case the court did not pass on the important issues raised regarding the principles and methods of valuation, but held that even if the value of the O'Fallon was as great as its owners and counsel claimed the recapture from it of the amount of earnings the commission proposed would not involve confiscation. A special court composed of United States Circuit Judges Kimbrough Stone and Arba Van Valkenburg and United States District Judge C. B. Faris, the same judges who rendered the decision, on December 19 granted counsel for the O'Fallon an appeal to the United States Supreme Court from the court's findings as announced on December 10.

The Lower House of the Alaska Territorial Legislature has sent to Congress a memorial asking that a law be enacted whereby the United States shall consent to be sued in actions founded upon contracts in connection with the government's Alaska Railroad or for damages arising out of the operation of the railroad. It is desired that such a law declare the Alaska Railroad a common carrier, subject to all the laws of the United States pertaining to common carriers; that such actions may be prosecuted in the courts of Alaska and that judgment rendered against the United States may be paid in the same manner as judgments rendered in the United States Court of Claims. The memorial says that the railway has been a valuable factor in the development of Alaska, but is greatly hampered because of the fact that no protection whatever is afforded either the traveling public or the employees of the railroad against the dangers and hazards incident to railway travel.

The American Railway Engineering Association and the American Society of Civil Engineers have been invited to co-operate with the congressional flood control committee by furnishing data and recommendations. In response, D. J. Brumley, president of the A. R. E. A., appointed a committee consisting of L. A. Downs, president, Illinois Central; A. F. Blaess, chief engineer, Illinois Central; R. W. Barnes, chief engineer, Southern Pacific Lines in Louisiana and Texas; H. Baldwin, chief engineer, Cleveland, Cincinnati, Chicago & St. Louis; C. R. Mee, chief engineer, Louisville Railway & Navigation Company; J. R. Fordyce, consulting engineer; E. A. Hadley, chief engineer, Missouri Pacific; W. S. Hanley, chief engineer, St. Louis Southwestern; C. S. Kirkpatrick, chief engineer, Gulf Coast Lines; F. G. Jonah, chief engineer, St. Louis-San Francisco; C. A. Morse, chief engineer, Chicago, Rock Island & Pacific; E. F. Mitchell, chief engineer, Texas & Pacific; E. F. Salisbury, chief engineer, Louisiana & Arkansas; and B. A. Wood, chief engineer, Mobile & Ohio.

The E. H. Harriman Gold Medal for the most conspicuous accident prevention work by a railroad of this country operating 10,000,000 or more locomotive miles during the year ending December 31, 1926, has been awarded to the Norfolk & Western, which showed a reduction of more than 28 per cent in passenger fatalities. The first prize for roads operating from 1,000,000 to 10,000,000 locomotive miles, a silver replica of the gold medal, was awarded to the Duluth, Missabe & Northern, which thus won this prize for the second consecutive year. During 1925 and 1926 not a person was killed and only three passengers were injured on this road. The first prize for roads operating less than 1,000,000 locomotive miles is a bronze replica of the gold medal and this was awarded to the Quincy, Omaha & Kansas City which is 249 miles long. During 1926 it operated 432,000 locomotive miles with a total passenger mileage of 4,994,000, during which time no passengers were killed or injured in any kind of accident. No one was killed at a highway grade crossing or elsewhere and only one person was injured, a farmer driving a team on a grade crossing.

Personal Mention

General

S. R. Lamb, bridge and building master on the Saskatoon division of the Canadian Pacific, with headquarters at Saskatoon, Sask., has been promoted to assistant superintendent on the Brandon division of the Manitoba district with headquarters in Minnedosa, Man.

G. H. Warfel, acting assistant to the general manager of the Union Pacific, with headquarters at Omaha, Neb., and formerly general roadmaster on the Nebraska division of that road, has been promoted to assistant to the general manager and will continue to have supervision over safety work and similar matters.

J. H. Cooper, engineer maintenance of way of the Southern division of the Eastern region of the Pennsylvania, with headquarters at Wilmington, Del., has been promoted to superintendent of the Schuylkill division, with headquarters at Reading, Pa. A photograph of Mr. Cooper, together with a sketch of his career, was published in the July, 1927, issue of *Railway Engineering and Maintenance* at the time of his promotion to engineer maintenance of way of the Southern division.

R. R. Cummins, roadmaster on the Columbus division of the Central of Georgia, with headquarters at Columbus, Ga., has been promoted to superintendent of the Savannah division, with headquarters at Savannah, Ga. Mr. Cummins was born on September 30, 1884, at Marion, Ala., and was educated at the University of Alabama, where he graduated in 1906. He served for a time as rodman and instrumentman on the Seaboard Air Line and from July, 1907, until August, 1909, was a transitman on location and a resident engineer on construction work on the Georgia & Florida, from Vidalia, Ga., to Madison, Fla. He entered the service of the Central of Georgia on August 27, 1909, as a draftsman in the chief engineer's office and from January 1, 1912, to January 15, 1914, was an assistant engineer, following which he was a pilot engineer on federal valuation until June 1, 1916. On the latter date he was promoted to supervisor of bridges and buildings on the Southwestern division, being transferred to the Columbus division on January 20, 1918. On August 16 of the same year he was commissioned first lieutenant in the engineering service overseas. He was mustered out of the army in July, 1919, and on August 1 was appointed assistant trainmaster of the Columbus division of the Central of Georgia, becoming roadmaster of the Southwestern division on February 1, 1920. He was transferred to the Columbus division with headquarters at Columbus, on January 15, 1925, where he was located at the time of his recent promotion to superintendent of the Savannah division.

R. R. Cummins

George LeBoutillier, vice-president of the Long Island, with headquarters at New York, whose early railway training and experience was in the engineering department, has been appointed also resident vice-president of the Pennsylvania at New York City, a newly created position. Mr. LeBoutillier was born on February 2, 1876, at Cincinnati, Ohio, and was educated at the University of Cincinnati. He entered railway service in August, 1895, as a rodman on the Pennsylvania and was promoted to assistant division engineer on November 1, 1900. He was further promoted to division engineer on July 1, 1903, and on February 1, 1914, entered the operating department as superintendent. On March 1, 1920, he was promoted to general superintendent on the Eastern region with headquarters at Harrisburg, Pa. He was elected vice-president of the Long Island in January, 1923, which position he still holds in addition to that of resident vice-president of the Pennsylvania at New York.

Charles E. Smith, an engineer by education and experience, has been appointed vice-president of the New York, New Haven & Hartford, with headquarters at New Haven, Conn., in which capacity he will assist the president in problems relating to improvements, construction, operation and such other matters as may be assigned. Mr. Smith was born in 1877 at Somerville, Mass., and graduated from the Massachusetts Institute of Technology in 1900. He entered railway service in the summer of 1897 in the engineering department of the New York & New England (now a part of the New York, New Haven & Hartford). After graduation from the M. I. T. in 1900, Mr. Smith was employed in the bridge engineering department of the New Haven, where he remained until 1903, after which time he was in the service of the United States government and later was assistant bridge engineer of the Lake Shore & Michigan Southern (now a part of the New York Central), with headquarters at Cleveland, Ohio. Mr. Smith entered the service of the Missouri Pacific in 1907 and by successive advancements was promoted to assistant chief engineer in charge of maintenance and construction. After leaving the Missouri Pacific in 1915 he established the firm of C. E. Smith & Co., and acted as consulting adviser for railroads, municipalities, public utilities and industial companies. He acted as consulting engineer and technical adviser to the City of St. Louis, Mo., during this period and was chairman of a joint committee which made a study of and a report on the railroad situation in the St. Louis terminal area. He also investigated and reported on the plans for union station facilities at New Orleans, La., and on the joint railway situation at Ft. Worth, Tex. During the world war Mr. Smith was a major in the construction division of the United States Army.

Charles E. Smith

Charles E. Johnston, vice-president and general manager of the Kansas City Southern, with headquarters at Kansas City, Mo., and formerly chief engineer of that road, has been elected president, effective January 1, to succeed **Job A. Edson,** who retires on that date.

Mr. Johnston was born on October 30, 1881, at St. Elmo, Ill., and entered railway service in May, 1897, in the engineering department of the Chicago, Paducah & Memphis (now a part of the Chicago & Eastern Illinois). He entered the employ of the St. Louis Southwestern in August of the same year, where he remained until June, 1898. He was in the service of the Chicago & Eastern Illinois during 1899, and from January, 1900, to February, 1903, was assistant engineer on location, construction and maintenance on the St. Louis-San Francisco. From February, 1903, to June of the same year he was a resident engineer on location and construction on the Missouri Pacific, when he returned to the Frisco as assistant engineer maintenance of way. In October, 1906, he became locating engineer on the Kansas City Southern and in August, 1908, was made office engineer. He was promoted to division engineer in June, 1909, and was advanced to chief engineer in January, 1911. He was promoted to general manager in Feb-

ruary, 1917, and was elected vice-president and general manager on May 20, 1924, which position he was holding at the time of his election as president.

W. E. Fowler, chief engineer of the Montour, with headquarters at Coraopolis, Pa., has been promoted to general superintendent, a newly created position, with headquarters at the same point, effective January 1. Mr. Fowler, who will have supervision over the maintenance and transportation departments, was born on July 14, 1888, at Towanda, Pa., and was educated at Pennsylvania State College. He entered the railway service on August 1, 1909, with the Pennsylvania Tunnel & Terminal (nor a part of the Pennsylvania). On February 1, 1910, he went with the Pennsylvania, on the Monongahela division, where he remained until September 1, 1918, when he entered the employ of the United States Steel Corporation. He was appointed chief engineer of the Montour on December 1, 1918, which position he was holding at the time of his recent promotion to general superintendent.

Engineering

Charles E. Beveridge, who has been employed in the engineering department of the Union Pacific for the past 10 years with headquarters at Green River, Wyo., has been appointed engineer of the maintenance of way department of the Utah Railway with headquarters at Price, Utah.

Moses Burpee, chief engineer of the Bangor & Aroostook, with headquarters at Houlton, Me., retired on December 31, at his own request, to become consulting engineer of that road. **P. C. Newbegin,** maintenance engineer, with headquarters at the same point, has been promoted to chief engineer.

Edward R. Scott, traveling accountant for the maintenance of way department of the New York Central lines Buffalo and east, has been promoted to office engineer in the maintenance of way department of the same territory to succeed **J. F. McDonald,** who will be associated with **J. V. Neubert,** chief engineer maintenance of way.

R. R. Metheany, division engineer on the Eastern region of the Pennsylvania, with headquarters at Altoona, Pa., has been promoted to engineer maintenance of way of the Southern division, with headquarters at Wilmington, Del., to succeed **J. H. Cooper,** whose promotion to superintendent of the Schuylkill division, with headquarters at Reading, Pa., is noted elsewhere in this issue.

H. C. Mann, assistant chief engineer of the Union Pacific System, with headquarters at Omaha, Neb., has been promoted to chief engineer, effective January 1, to succeed **R. L. Huntley,** who retired under the pension rules of the company on that date. **G. J. Adamson,** division engineer of the Union Pacific, with headquarters at Green River, Wyo., has been promoted to assistant chief engineer of the system to succeed Mr. Mann, and **J. R. Ellis,** assistant engineer, with headquarters at Omaha, has been promoted to division engineer at Green River to replace Mr. Adamson.

F. O. Condon, engineer maintenance of way of the Atlantic region of the Canadian National, with headquarters at Moncton, N. B., has been promoted to principal assistant engineer of the same region, with headquarters in the same city. **T. L. Landers,** division engineer of the Edmunston division, with headquarters at Edmunston, N. B., has been promoted to engineer maintenance of way, with headquarters at Moncton, to replace Mr. Condon and **E. W. G. Chapman** has been appointed division engineer of the Edmunston division to succeed Mr. Landers. **F. S. Wilkins** has been appointed division engineer of the Island division with headquarters at Charlottetown, P. E. I., succeeding **Alexander Scott,** who has been transferred to the Halifax division, with headquarters at Halifax, N. S., to take the place of **L. H. Robinson,** who has been promoted to assistant engineer maintenance of way of the Atlantic region, with headquarters at Moncton.

Mr. Condon was born on July 21, 1878, at Moncton, N. B., and entered the service of the Intercolonial Railway (now a part of the Canadian National), on February 14, 1893, serving in minor capacities until October 1, 1899, when. he became a draftsman. Later he was promoted to instrumentman, and on April 1, 1912, was again promoted, to resident engineer. He served in this capacity until September 1, 1913, when he was made division engineer on the Campbellton division. From January 1, 1916, to March 1, 1923, he served as district engineer at Moncton, and on the latter date was promoted to engineer maintenance of way, which position he was holding at the time of his recent promotion to prinprincipal assistant engineer of the Atlantic region.

Mr. Landers was born on December 15, 1888, at Farnham, Que., and was educated at Bishop's College, Lennoxville, Que. He entered railway service in May, 1910, as a rodman on the Canadian Pacific at Farnham and served successively as a draftsman and a transitman until October, 1913, when he became a transitman on the Intercolonial (now a part of the Canadian National). He was promoted to resident engineer at Truro, N. S., in May, 1915, and from January, 1917, to September, 1919, was assistant engineer on the Canadian Government Railway, with headquarters at Levis, Que. In September, 1919, he was promoted to division engineer of the Edmunston division, with headquarters at Edmunston, N. B., which position he was holding at the time of his recent promotion to engineer maintenance of way of the Atlantic region.

Track

M. C. Lofton has been promoted to district roadmaster on District No. 1, of the Rio Grande division of the Texas & Pacific, with headquarters at Sweetwater, Tex.

Lloyd Dippert, section foreman on the Chicago & North Western at Andrews, Neb., has been promoted to roadmaster, with headquarters at Lusk, Wyo., to replace **H. L. Barr,** who has been transferred to Boone, Iowa, to succeed **P. Scanlan,** who has retired after a service of 41 years.

John Christenson, section foreman on the Chicago, Rock Island & Pacific at Roswell, Colo., has been promoted to roadmaster, with headquarters at Belleville, Kan., to replace **C. Kelley,** who has been transferred to Fairbury, Neb., to succeed **A. Shumate,** notice of whose death was published in the December issue.

Raymond W. Davis has been appointed roadmaster of the Fargo division of the Northern Pacific, with headquarters at East Grand Forks, Minn., to take the place of **Patrick J. Carney,** who has been pensioned. **Alfred E. Perlman** has been appointed roadmaster of the Dakota division, with headquarters at Carrington, N. D., to replace **William A. McCarthy,** who has been transferred to Mandan, N. D., to succeed **Nels Anderson,** who has been transfered to the Yellowstone division.

Frank Smith, roadmaster on the Missouri-Kansas-Texas, with headquarters at Waco, Tex., who was general foreman in charge of the ballast crushing plant at Sweeney, Mo., since last spring, has resumed his duties as roadmaster at Waco. **Ray Sherman,** who was acting roadmaster during Mr. Smith's absence has been made general foreman in charge of rail laying and ballasting on the Texas Central, a subsidiary of the M-K-T. **G. L. Moody,** roadmaster at South McAlester, Okla., who was assigned as general foreman in charge of rail laying on the St. Louis district has resumed his duties as roadmaster at South McAlester. **T. Burns** has been appointed roadmaster on the St. Louis district to succeed **R. E. Patterson,** whose retirement was noted in the December issue.

Leo T. Day, whose appointment as roadmaster on the Chicago & North Western, with headquarters at Proviso, Ill., was noted in the December issue, was born on January 18, 1890, at Appleton, Wis., and entered railway service in September, 1913, as a chainman on maintenance on the Chicago & North Western. He was promoted successively to rodman and instrumentman on construction, serving in the latter capacity until April, 1918, when he entered the United States army, serving with the 57th Infantry until April, 1919, when he returned to the North Western as an instrumentman on construction and valuation. He was promoted to assistant engineer on construction on October 1, 1924, and in February,

1926, was further promoted to general foreman on construction, which position he was holding at the time of his recent promotion to roadmaster.

Harry C. Koch, whose promotion to roadmaster on the Belt Railway of Chicago, with headquarters at Clearing yard, Ill., was noted in the December issue, was born on February 21, 1897, and entered railway service as a clerk in the office of the general superintendent of the Belt Railway of Chicago in April, 1913, serving in this capacity until 1916 when he became a clerk in the freight department of the Illinois Central at Chicago. He returned to the Belt Railway later in the same year as a clerk in the maintenance of way department. He was in the United States army in 1916 and 1917, serving one year overseas as a battalion major at the headquarters of the 33rd division. On his return to civil life he was promoted to chief clerk in the maintenance of way department of the Belt Railway, which position he was holding at the time of his recent promotion to roadmaster.

D. R. Byrne, whose promotion to district roadmaster on the Union Pacific, with headquarters at Laramie, Wyo., was noted in the December issue, was born on February 5, 1882, at Ogden, Utah, and entered railway service on May 1, 1901, as a section laborer on the Union Pacific. He was promoted to foreman in 1906 and served as section and extra gang foreman until 1917 when he was promoted to assistant roadmaster on new double track work and other construction in Utah and Wyoming. From 1918 to 1922 he was section and extra gang foreman and in that period also served as acting roadmaster between Evanston, Wyo., and Ogden, Utah. From 1922 to 1926, Mr. Byrne served as section, extra gang and general foreman on the Western division, and in 1926 and 1927 was general foreman on the construction of new double track between Echo, Utah, and Gateway, and also on the new terminal yard at Ogden, Utah, which position he was holding at the time of his recent promotion to district roadmaster.

D. M. Howard, assistant supervisor on the Philadelphia Terminal division of the Pennsylvania, at North Philadelphia, Pa., has been promoted to acting supervisor on the Williamsport division at Williamsport, Pa., succeeding **C. S. Hager,** who has been assigned to the office of the chief engineer maintenance of way at Philadelphia. **P. E. Feucht,** assistant supervisor on the Philadelphia Terminal division, at South Philadelphia, has been transferred to North Philadelphia on the same division and **J. J. Cluts,** assistant supervisor at Camden, N. J., has been transferred to the Philadelphia Terminal division at South Philadelphia. **R. L. Baird,** supervisor in the office of the chief engineer maintenance of way, has been transferred to the office of the general superintendent of the Philadelphia Terminal division. **W. A. Trimble,** assistant supervisor on the Tyrone division at Tyrone, Pa., has been transferred to the Philadelphia division at Middletown, Pa. **J. B. Hill,** assistant supervisor, with headquarters at Spencer, Ind., has been promoted to supervisor, with headquarters at Frankfort, Ind., to succeed **H. W. Bennett,** resigned. **Andrew M. Lood,** track foreman, has been promoted to supervisor, with headquarters at Petoskey, Mich., and **Phillip O'Connor,** track foreman, has been promoted to supervisor, with headquarters at Upper Sandusky, Ohio, succeeding **J. M. Lee,** who has been transferred to Detroit, Mich.

Bridge and Building

J. R. Morphew, bridge inspector on the Illinois Central, with headquarters at Chicago, has been promoted to supervisor of bridges and buildings, with headquarters at Ft. Dodge, Iowa, to succeed **J. Jordan,** retired.

John S. Brinkley, foreman carpenter on the Philadelphia division of the Pennsylvania, has been promoted to master carpenter on the Sunbury division, at Sunbury, Pa., succeeding **D. E. Wiltse,** who has been transferred to the organization of the chief engineer, Philadelphia improvements.

Perley N. Watson, who since 1881 has been superintendent of bridges and buildings of the Maine Central, with headquarters at Brunswick, Me., has retired and **Elbridge A. Johnson,** superintendent of bridges and buildings at Bangor, Me., has been transferred to Portland, Me., and given jurisdiction over the entire system.

G. Tornes, chief carpenter of the Dubuque division of the Chicago, Milwaukee & St. Paul, with headquarters at Dubuque, Iowa, has been promoted to general supervisor of buildings, with headquarters at Chicago, to succeed **N. H. La Fountain,** notice of whose death was published in the December issue. **Lawrence Farley,** bridge and building foreman on the Kansas City division, has been promoted to chief carpenter of the Dubuque division with headquarters at Dubuque, to succeed Mr. Tornes.

Purchasing and Stores

Stephen R. Manion has been appointed storekeeper of the Northern division of the Pennsylvania to succeed **Fred Rees,** who has been assigned to other duties.

Frank E. Cragin has been appointed general storekeeper of the Los Angeles & Salt Lake unit of the Union Pacific system, with headquarters at Los Angeles, Cal., succeeding **J. H. Cragin,** deceased.

W. N. Strong has been appointed storekeeper on the Chesapeake & Ohio, with headquarters at Can Fork, W. Va., to succeed **J. R. Grey,** deceased.

Samuel Porcher, assistant vice-president of the Pennsylvania in charge of purchases, stores and insurance, and prior to January 1, 1927, general purchasing agent of that road, with headquarters at Philadelphia, Pa., retired on December 31 under the pension regulations of that road, after a service of nearly 45 years. A sketch of Mr. Porcher's career was published in the January, 1927, issue of *Railway Engineering and Maintenance.*

Leon A. Myers has been appointed division storekeeper on the Northern Pacific, with headquarters at Tacoma, Wash., to succeed **Milton A. Cole,** who retired on December 1, after 40 years' service with that company.

Obituary

George Blair, master carpenter on the Cresson division of the Pennsylvania, with headquarters at Cresson, Pa., died on November 18.

W. F. Naumann, division storekeeper on the Illinois Central, with headquarters at East St. Louis, Ill., died in that city on October 26.

J. H. Cragin, general storekeeper of the Los Angeles & Salt Lake unit of the Union Pacific system, with headquarters at Los Angeles, Cal., died in that city on November 28.

John C. Degnan, superintendent of water service on the New York, Ontario & Western, died of heart disease at his home in Middletown, N. Y., on December 10, at the age of 69 years.

Thomas O. Wood, purchasing agent of the Gulf, Colorado & Santa Fe, with headquarters at Cleburne, Tex., died on December 10 at Temple, Tex., at the age of 77 years. Mr. Wood was taken suddenly ill at Oakdale, La., while on an inspection trip.

Silas Wright DeWolf, vice president and general manager of the Texas-Mexican, with headquarters at Laredo, Tex., who was an engineer by education and experience, died at his home at Laredo on December 3 from heart disease. Mr. DeWolf was born on February 17, 1859, at Columbus, Ga., and was educated at the University of Georgia. He entered railway service in September, 1886, in the engineering department of the Central of Georgia, and in March, 1889, became a levelman on the construction of the Savannah, Americus & Montgomery (now a part of the Seaboard Air Line). Later in the same year he was appointed roadmaster on the Mexican National (now a part of the National Railways of Mexico) with headquarters at Laredo, where he remained until September, 1901, when he was appointed roadmaster on the Mexican Southern at Puebla Pue. He was superintendent of the Ixtlahuaca, Mex., from May, 1902, to May, 1903, after which he became resident engineer on the Mexican National and later general agent for the road in Texas. He was promoted to general superintendent on the Texas-Mexican (controlled by the Mexican National) on August 1, 1908, and continued in this position until December 1, 1914, with the exception of three years from 1909 to 1912 when he was engaged in private business. Mr. DeWolf was promoted to general manager on December, 1914,

and was elected vice-president and general manager on July 1, 1915, which position he was holding at the time of his death.

Edwin O. Faulkner, vice-president of the Santa Fe Land Improvement Company, and in charge of the California oil properties of the Atchison, Topeka & Santa Fe, with headquarters at Los Angeles, Cal., who during his earlier railway career was a pioneer in the application of timber preservation, died on December 17 at Los Angeles. Mr. Faulkner was born on March 3, 1850, at Forfar, Scotland, and came to Canada at the age of 21 years, coming to the United States a few years later. He entered the service of the Santa Fe in 1889 as an assistant in the office of the president at Chicago and was transferred to the office of the general auditor at the same point in November, 1893. After serving as manager of the St. Louis, Kansas City & Colorado (then controlled by the Santa Fe and now a part of the Chicago, Rock Island

Edwin O. Faulkner

& Pacific), at St. Louis, Mo., and the Pecos (now a part of the Santa Fe) at Eddy, N. M., Mr. Faulkner was appointed assistant to the general manager with headquarters at Topeka, Kan., in November, 1897. In April, he was promoted to manager of the tie and timber department, with headquarters at Topeka, serving at that point and at Los Angeles until 1918. Shortly after his appointment as manager of the tie and timber department, Mr. Faulkner entered into correspondence with Hulsberg & Co., Charlottenberg, Germany, which resulted in the introduction into this country of the Rueping process of treating ties, the first ties thus treated on a large scale being placed in Santa Fe track in 1906. Mr. Faulker was elected vice-president of the Santa Fe Land Improvement Company and other subsidiary companies on the West coast in 1918, which position he was holding at the time of his death. Mr. Faulkner was a charter member of the American Wood Preservers Association, and since 1915 an honorary member. He served this organization as vice-president in 1906.

Construction News

The Atchison, Topeka & Santa Fe has awarded a contract for the construction of an automatic electric sand handling and drying plant, with a storage capacity of 540 tons of wet sand in a steel pocket, at Temple, Tex., to the Ogle Construction Company, Chicago.

The Baltimore & Ohio has awarded a contract to the Vang Construction Company, Cumberland, Md., for bridge and grading work at Woodsdale, Ohio, at a cost of $175,000.

The Boston & Albany has awarded a contract to the New England Construction Company of Springfield, Mass., for bridge repairs at Chester and Bucket, Mass., growing out of the recent flood damage.

The Boston & Maine is considering plans for the building of a bridge on its line at Livermore Falls, N. H. A contract for the installation of automatic electric coaling station equipment at Troy, N. Y., has been let to the Roberts & Schaefer Company, Chicago.

The Bureau of Reclamation has awarded a contract for the construction of a railway, 22 miles long to the Owyhee River reclamation project in the vicinity of Vale, Ore., to the General Construction Company, Seattle, Wash., at a cost of $345,300.

The Canadian National's agreement with the city of Vancouver, B. C., for the erection in that city of a large hotel has been approved by an order in council passed at a meeting of the federal cabinet in Ottawa. The hotel will have about 400 rooms and will cost approximately $4,000,000. Construction of this latest addition to the Canadian National's chain of hotels will commence near the close of next year when it is expected the addition to the Chateau Laurier in Ottawa will be completed.

Plans are being considered for the construction of new facilities at Hamilton, Ont., to cost about $1,000,000. This road also has under consideration the construction of a new hotel at Halifax, to have 160 bedrooms, and be designed for later additional stories to give it an ultimate capacity of 300 rooms. Combined with the hotel a new terminal is being planned.

The Cambria & Indiana has been granted a further extension of time to June 30, 1929, by the Interstate Commerce Commission for the completion of its proposed extension in Pennsylvania, under the certificate issued by the Commission February 11, 1925.

The Chesapeake & Ohio, together with the Richmond, Fredericksburg & Potomac, has let a contract to Doyle & Russell, Richmond, Va., for the construction of a joint passenger station at Doswell, Va. The structure will be of brick with a slate roof and of colonial architecture. The central portion will be 20 ft. by 40 ft. and there will be two wings, each 19 ft. by 27 ft. 6 in. The cost of the project will be approximately $30,000.

The Chicago & North Western has undertaken the depression and rearrangement of tracks in North Water street, Chicago, with company forces, to provide proper clearance in connection with the construction of a bridge by the city over the Chicago river at La Salle street. The cost of this work is expected to approximate $60,000.

The Chicago, Indianapolis & Louisville has been ordered by the Public Service Commission of Indiana to separate the highway and railroad grades at the crossing of the Crown Point-Cedar Lake highway at Armour, Ind.

This company plans the immediate construction of either a timber or reinforced concrete coaling station at Lafayette, Ind., to replace a structure destroyed by fire on November 12 with a loss estimated at $25,000.

The Chicago, Milwaukee & St. Paul has been authorized by the federal court at Chicago to expend $28,580 for the construction of a water treating plant at South Minneapolis, Minn., which will have a capacity of 40,000 gal. per hour. Authorization has also been given for the reconstruction of a snowshed 845 ft. long, 1 mile west of Rockdale, Wash.. at a cost of about $34,800, and the construction of a three-span steel girder bridge at Marquette, Iowa, at a cost of $26,600, to replace a pile trestle.

Plans of this company for the separation of railroad and street grades at Milwaukee, Wis., for which the first contract was let in July for the construction of two highway subways, include the depression of four main tracks for a distance of 9,500 ft. and the elevation of four main tracks for a distance of 2,000 ft., the relocation of a team yard and freight station to serve the North Avenue district and the construction of a classification and storage yard to replace facilities which must be abandoned because of the grade separation. Six bridges will be constructed to carry streets over the track depression. The total expenditure required for this project is estimated to be about $3,500,000.

The Chicago, Rock Island & Pacific, subject to the approval of the Interstate Commerce Commission, will join with the St. Louis-San Francisco in the construction of a new passenger station at Oklahoma City, Okla., the citizens having voted approval of a $4,000,000 bond issue to be used in acquiring the present right of way and passenger station site of the Rock Island in that city.

The Cleveland Union Terminal has awarded a contract for the construction of a reinforced concrete viaduct and runway at Prospect avenue, Cleveland, Ohio, to the Hecker-Moon Company, Cleveland, at a cost of about $200,000.

The Detroit, Toledo & Ironton has awarded a contract for the excavation

of more than 200,000 cu. yd. of material for a new line between Malinta, Ohio, and the Maumee river, 5½ miles, to Roberts Brothers, Chicago, at a cost of about $100,000.

The Great Northern has awarded a contract for the relocation of about 5,000 ft. of line along the Kootenai river east of Bonner's Ferry, Idaho, to Morrison and Knudsen, Spokane, Wash., at a cost of about $500,000. This project involves the construction of a 900-ft. concrete lined tunnel.

The Long Island and the borough officers of Manhattan (New York City) and Brooklyn are considering plans for putting the tracks of the Atlantic avenue, Brooklyn, division of the Long Island underground to eliminate approximately 30 grade crossings in the city of Brooklyn and to make a boulevard of Atlantic avenue. The approximate cost as figured by the Board of Estimate of New York City is $26,000,000, of which the railroad's share would be a little over $9,000,000. Other grade crossing elimination projects on the Long Island include eliminations at Corona, Springfield, St. Albans and Rockaway Beach. The Transit Commission of New York desires crossings eliminated at these points in 1928. It is estimated that eliminating eight grade crossings at Springfield and St. Albans would cost about $1,900,000; four crossings at Corona, $1,000,000, and 26 crossings between Arverne and Rockaway Park, $7,000,000.

The Louisville & Nashville has awarded a contract for the construction of a line between Chevrolet, Ky., and Hagans, Va., 13 miles, to W. W. Boxley & Co., Roanoke, Va., at a cost of about $2,500,000. The total cost of the extension is estimated at more than $5,000,000.

The Meridian & Bigbee River, following the completion of construction of the first section of this line between Meridian, Miss., and Cromwell, Ala., 30 miles, on December 15, has announced that construction of the remaining 20 miles between Cromwell and Myrtlewood, Ala., will be undertaken early in 1928.

The New York Central has given a contract to Wright & Kremers, Inc., Niagara Falls, N. Y., for the construction of a freight house with platforms and canopies, at North Tonawanda, N. Y.

The New York, Chicago & St. Louis has awarded a contract for the construction of a one-story brick, steel and concrete freight station at Cleveland, Ohio, to the S. W. Emerson Company, Cleveland, at a cost of about $150,000. Outside dimensions of the building will be 80 ft. by 460 ft.

A contract for the construction of a concrete retaining wall at Broadway avenue, Cleveland, Ohio, which will have a length of about 1,790 ft., has been let to the Industrial Construction Company, Cleveland, at a cost of about $100,000. Construction of a retaining wall near the property of the Standard Oil Company at Cleveland will be undertaken by H. E. Culbertson, Cleveland, to whom the contract has been let at a cost of about $400,000.

The Pennsylvania has let a contract for the erection of a one-story steel store building at Olean, N. Y., to the Austin Company, Cleveland, Ohio.

This road, together with the officers of the city of Camden, N. J., is considering plans for improvements at Camden which involve the elimination of about 15 grade crossings in that city.

The Reading contemplates the construction of a steel bridge over the Raritan canal and the Raritan river on its line at Bound Brook, N. J.

A contract has been awarded to the Ogle Construction Company, Chicago, for the construction of a 200-ton reinforced concrete coaling station at Cressona, Pa. Included in this contract is the construction of a sand handling plant and a two-track cinder pit.

The St. Louis-San Francisco has awarded a contract for the construction of frame passenger and freight stations and miscellaneous buildings along the line now under construction between Aliceville, Ala., and Kimbrough to the C. G. Kershaw Contracting Company, Birmingham, Ala., at a cost of approximately $90,000.

Plans have been prepared for the construction of viaducts over the tracks of this railroad at Benton avenue and Grant avenue, Springfield, **Mo. The Benton avenue** structure will be 1,050 ft. long, with a 40-ft. roadway and will cost about $200,000, of which amount the city has authorized an issue of $75,000 of bonds to pay its share of the cost. The Grant avenue viaduct will have a similar length with a 36-ft. roadway and will involve a total expenditure of $275,000, of which amount the city has authorized the issuance of $90,000 of bonds.

The Texas-New Mexico has received approval from the office of the attorney general of Texas of its application for a charter for the construction of a railroad from a point near Monahans, Tex., on the Texas & Pacific to a point along the Texas-New Mexico boundary north of Kermit, Tex., to reach hitherto undeveloped oil fields. The length of the line will be about 35 miles.

The Texas & Pacific has awarded a contract to the Missouri Valley Bridge & Iron Co., Leavenworth, Kan., for the construction of a bridge over the Atchafalaya river near Melville, La., to consist of five fixed spans and one vertical lift span.

The Union Pacific has awarded a contract for the construction of an employees' clubhouse at Caliente, Nev., at a cost of about $90,000, to the Rhyberg-Sorenson Company, Salt Lake City, Utah.

The Wabash plans the construction of a passenger station on Delmar boulevard, St. Louis, Mo., in conjunction with a viaduct now under construction at that point. The cost of the station is estimated at $300,000.

Supply Trade News

General

The American Hoist & Derrick Company, St. Paul, has moved its Seattle office from 1501 L. C. Smith building to 503 Biltmore apartments.

The Eppinger & Russell Company, New York, has moved its main office from 165 Broadway to the Park-Murray building, 11 Park place, New York.

The Hymen-Michaels Company, Chicago, has been appointed sales agent for the mid-west territory of the Ohio Locomotive Crane Company, Bucyrus, Ohio, and its subsidiary, the Toledo Crane Company.

The Dearborn Chemical Company, Chicago, has opened a warehouse, plant and office at 807 Mateo street, Los Angeles, Cal. The building is of brick and concrete construction and is 57 ft. by 115 ft. in size, containing 13,000 sq. ft. of floor space. The plant is equipped with blending tanks for individual lubrication requirements together with the machinery and equipment for the manufacture and storage of other products of the company.

The Bates Valve Bag Company, Chicago, will build a factory at Birmingham, Ala., for the manufacture of its multi-wall paper bags for cement, plaster, lime and other rock products. The initial unit will be 250 ft. long by 60 ft. wide, one story in height, and will be of fire-proof construction. The factory will contain space for warehousing the filling machines which are used for cement and other rock products, wire ties used for cotton and jute bags, and which are also used in reinforced concrete construction, and a supply of spare parts for all Bates equipment.

Personal

Luther Rice, formerly chief engineer of the Robert W. Hunt Company, died at Glendale, Cal., on November 19.

James A. Donahey, sales and service engineer of the Cleveland Frog & Crossing Company, Cleveland, Ohio, has been promoted to manager of sales, to succeed **George Stanton,** deceased.

P. C. Doerr, who has been connected with the Cohoes Rolling Mill Company, Cohoes, N. Y., will devote all his time to railroad sales, a special railroad sales department having been established by that company.

Benjamin Johnson, president of B. Johnson & Son, Richmond, Ind., died in that city on December 5. He was born on January 26, 1883, in Columbiana County, Ohio, and entered the lumber business in 1858. Since 1873 he was continuously engaged in the production of ties and lumber.

Charles W. Gray, secretary and treasurer and a director of the Graham Bolt & Nut Company, Pittsburgh, Pa., died

on December 7. Mr. Gray had been connected with the Graham Bolt & Nut Company for more than 25 years.

Charles B. Manville, founder of the Johns-Manville Company, died on November 26 at his home in Pleasantville, N. Y., at the age of 92. Mr. Manville started the business in 1858 and retired from active participation in it in 1902. The present firm name was adopted in January, 1927.

Van Cortright Mekeel, formerly connected with the Taylor-Wharton Iron & Steel Company, High Bridge, N. Y., in various capacities as special research investigator, mechanical engineer and sales engineer, has resigned to become special representative of the Nugent Steel Castings Company, Chicago, with headquarters at Chicago.

John S. Keefe, vice-president of the American Steel & Wire Company since its organization in 1899, with headquarters at Chicago, has been elected president to succeed **W. S. Palmer,** who died on December 17, at his home in Cleveland, Ohio, after a short illness.

Mr. Palmer was born on June 17, 1861, and served as secretary to Carnegie, Phipps & Co., in 1887. He was afterwards general sales agent and assistant to the president of the Carnegie Steel Company and from 1896 to 1898 was vice-president of the Illinois Steel Company. He had been general manager and president of the American Steel & Wire Company since 1899.

C. N. Thulin, vice-president of the Duff Manufacturing Company, Pittsburgh, Pa., who has had charge of the Western sales district of the company, has taken over also the supervision of the Eastern sales district succeeding **P. G. O'Hara,** former vice-president, with headquarters at New York, who has resigned to join the organization of the Vacuum Oil Company at New York. Mr. Thulin's headquarters will be at New York and Chicago. **W. G. Robb** has been appointed district manager of the New York district, with headquarters at the company's office at 250 Park avenue, New York, and **E. E. Thulin** has been appointed district manager of the Chicago district, with headquarters in the Peoples Gas Building, Chicago.

J. H. Dooling, assistant track supervisor on the Boston & Maine, with headquarters at Waltham, Mass., has been appointed representative of the railway appliances division of the American Fork & Hoe Company, Cleveland, Ohio, in the eastern territory, with headquarters at 1212 Whitehall building, New York. Mr. Dooling graduated from Northeastern University in 1911 and entered railway service in the same year as a chainman on the Boston & Albany, where he advanced to the position of senior draftsman in the office of the consulting engineer at Boston, Mass. In 1914, he entered the employ of the Boston & Maine as an instrumentman and in 1918 was placed in charge of the engineering staff in the office of the division engineer. In 1924 he was promoted to assistant track supervisor, which position he was holding at the time of his recent appointment as representative of the railway appliances division of the American Fork & Hoe Company.

L. M. Ritchie, district sales engineer of the National Carbon Company, Inc., and the Prest-O-Lite Company, with headquarters at Cleveland, Ohio, has been appointed district manager of railway sales of the E. I. du Pont de Nemours & Co., Inc., with headquarters at Chicago. Mr. Ritchie was born on March 20, 1892, at Bernise, Pa., and graduated from Allegheny College in 1916, receiving his master's degree in chemistry at the same college in the following year. Following this he became a member of the staff of the U. S.

L. M. Ritchie

Bureau of Standards at Washington, D. C., as assistant chemist in the Electro-Chemistry section of the Electrical division, being promoted in 1919 to associate chemist and assistant chief of this section. He resigned in 1922 to become district sales engineer of the National Carbon Company, Inc., and the Prest-O-Lite Company, with headquarters at Cleveland, Ohio, which position he was holding at the time of his recent appointment as district manager of railway sales of the E. I. du Pont de Nemours & Co., Inc.

C. Marshall Taylor has been appointed vice-president and general manager of the Curtin-Howe Corporation, New York, in which capacity he will look after the manufacture and sales of zinc meta-arsenite, a new wood preservative. Mr. Taylor was born on February 4, 1884, at Edgemont, Pa., and graduated from Swarthmore College in 1904, following which he was an instructor in chemistry in that college in 1904 and 1905. He served as a chemist for the Charles E. Hires Company during 1905 and 1906 and in the latter year became associated with the International Creosoting and Construction Company, at Texarkana, Tex. In 1910 he became superintendent of the Port Reading plant of the Reading and the Central Railroad of New Jersey. Mr. Taylor has been active in the work of the American Wood Preservers' Association, of which organization he was president in 1921. He also served as chairman of the Committee on Wood Preservation of the American Railway Engineering Association from 1919 to 1923.

Benjamin Bruce Shaw, formerly chief engineer of the Cuba Railroad, has been appointed sales engineer of the Argyle Railway Supply Company, Chicago. Mr. Shaw was born on February 2, 1886, at Canton, Ill., and graduated from the University of Illinois in 1911, receiving the degree of civil engineer from the same institution in 1916. He entered railway service in 1911 as a rodman on the construction of the St. Paul & Kansas City Short Line (now a part of the Chicago, Rock Island & Pacific), and later was promoted to assistant engineer in charge of construction. He was afterwards transferred to the Rock Island as an assistant engineer on maintenance at El Reno, Okla., and after serving a year in this capacity was promoted to division engineer of the Indian Territory division, with headquarters at Haileyville, Okla. In 1916, he was transferred to the Arkansas division, with headquarters at Little Rock and when the Louisiana division was consolidated with the Arkansas division he was made engineer of the Arkansas-Louisiana division. He resigned in the latter part of 1922 to become chief engineer of the Cuba Railroad, which position he held for several years.

W. Homer Hartz, treasurer of the Morden Frog & Crossing Works, Chicago, has been elected also vice-president and manager of sales to succeed **Arthur C. Smith,** notice of whose death was published in the December issue.

Mr. Hartz was born on December 11, 1887, at Tarrytown, N. Y., and graduated from Purdue University in 1907. He entered railway service in the summer of 1904 in the engineering department of the Chicago Southern (now a part of the Chicago, Milwaukee & St. Paul) on location and construction work. In December, 1906, he was employed by the Pennsylvania on track elevation work and in 1907 entered the service of the Baltimore & Ohio in the office of the division engineer at Cumberland, Pa. In the following year he became connected with the Oliver Mining Company at Mt. Iron, Minn., where he remained until 1909 when he entered the service of the engineering department of the Chicago, Milwaukee & St. Paul. In 1911 he became a draftsman for the Morden Frog & Crossing Works, being promoted successively to inspector, chief clerk and purchasing agent. He was further promoted to secretary in 1915 and to treasurer and assistant manager of sales in 1922, which latter position he was holding at the time of his recent promotion to vice-president and manager of sales.

The Pageant which was the leading feature of the "Fair of the Iron Horse" given by the Baltimore & Ohio, has been filmed for a moving picture.

Buyers' Guide

CLASSIFIED INDEX TO ADVERTISERS

Acetylene Dissolved
Oxweld Railroad Service Company

Air Compressors
Ingersoll-Rand Co.
Sullivan Machinery Co.

Air Hoists
Ingersoll-Rand Co.
Sullivan Machinery Co.

Air Lift Pumping Machinery
Ingersoll-Rand Co.
Sullivan Machinery Co.

Anchors, Rail
See Rail Anchors

Anti-Creepers, Rail
Bethlehem Steel Co.
Coover Railroad Track Brace Co.
Lundie Engineering Co.
P. & M. Co.
Track Specialties Co.
Verona Tool Works
Woodings Forge & Tool Co.

Asphalt
Barber Asphalt Co.
Lehon Co.

Automatic Take-Up Reels
Hayward Co.

Ballast Cleaners
Industrial Brownhoist Corp.

Ballast Screens
Maintenance Equipment Co.

Ballast Spreaders
Jordan Co., O. F.

Bank Builders
Jordan Co., O. F.

Bank Slopers
Jordan Co., O. F.

Ballast Trimmers
Jordan Co., O. F.

Band Saws
American Saw Mill Machy. Co.

Bags, Cement
Bates Valve Bag Co.

Bars
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Company

Bearings, Axle
Fairmont Railway Motors, Inc.
Kalamazoo Railway Supply Co.
Mudge & Company
Northwestern Motor Co.
Woolery Machine Co.

Bearings, Roller
Timken Roller Bearing Co.

Benders, Rail
See Rail Benders

Blocks, Paving
Interstate Car & Foundry Co.

Blowers, Turbo
Ingersoll-Rand Co.

Bolts
Bethlehem Steel Co.
Illinois Steel Co.
Track Specialties Co.

Bonding Outfits, Rail
Ingersoll-Rand Co.

Braces, Track
Coover Railroad Track Brace Co.
Edelblute Co., T. H.
Ramapo Ajax Corp.

Buckets
Hayward Co.
Industrial Brownhoist Corp.
Owen Bucket Co.

Buckets, Clam Shell
Hayward Co.
Industrial Brownhoist Corp.
Owen Bucket Co.
Williams Co., G. H.

Buckets, Drag Scrape; Orange Peel; Electric Motor
Hayward Co.

Building Beams, Concrete
Federal Cement Tile Co.
Massey Concrete Prod. Corp.

Building Papers
Lehon Co.

Bumpers, Car
Track Specialties Co.

Bumping Posts
Hayes Track Appliance Co.
Louisville Frog & Switch Co.
Mechanical Mfg. Co.

Calcium Carbide
Oxweld Railroad Service Co.

Car and Locomotive Replacers
Edelblute Co., T. H.

Car Replacers
American Chain Co., Inc.
Edelblute Co., T. H.

Cars, Ballast
See Ballast Cars

Cars, Dump
See Dump Cars

Cars, Hand
Buda Co.
Fairmont Ry. Motors, Inc.
Kalamazoo Ry. Supply Co.
Mudge & Co.
Northwestern Motor Co.

Cars, Industrial
Magor Car Corp.

Cars, Inspection
Fairmont Railway Motors, Inc.
Kalamazoo Railway Supply Co.
Mudge & Co.
Northwestern Motor Co.
Woolery Machine Co.

Cars, Motor
Fairmont Ry. Motors, Inc.
Kalamazoo Ry. Supply Co.
Mudge & Co.
Northwestern Motor Co.
Woolery Machine Co.

Cars, Section
Fairmont Railway Motors, Inc.
Kalamazoo Railway Supply Co.
Mudge & Co.
Northwestern Motor Co.
Woolery Machine Co.

Car, Spreader
Jordan Co., O. F.

Car Stop, Friction
Maintenance Equipment Co.

Cars, Velocipede
Fairmont Railway Motors, Inc.
Kalamazoo Railway Supply Co.
Mudge & Co.
Northwestern Motor Co.

Castings
Bethlehem Steel Co.
Louisville Frog & Switch Co.
Wharton, Jr. & Co., Inc., Wm.

Cattle Guards
Kalamazoo Railway Supply Co.

Cattle Passes
Massey Concrete Products Corp.

Cement Roofing Tile
Federal Cement Tile Co.

Cement Repair
Barber Asphalt Co.
Carey Co., Philip

Clamshell Buckets
See Buckets, Clamshell

Clips, Adjustable
Ramapo Ajax Corp.

Coal Handling Machinery
Hayward Co.
Industrial Brownhoist Corp.
Northwestern Engineering Co.

Compressors
Ingersoll-Rand Co.
Sullivan Machinery Co.

Compromise Joints
See Joints, Compromise

Concrete Roofing Tile
Federal Cement Tile Co.

Concrete Units, Miscellaneous
Federal Cement Tile Co.
Massey Concrete Prod. Corp.

Condensers
Ingersoll-Rand Co.

Corrugated Iron
Armco Culvert & Flume Mfrs. Ass'n.

Counterweight Drums
Hayward Co.

Cranes, Barge, Electric Erecting, Gantry, Locomotive, Pillar, Transfer, Tunnel, Wharf and Wrecking
Industrial Brownhoist Corp.
Interstate Car & Foundry Co.
Northwestern Engineering Co.

Creosoted Timber
See Timber, Creosoted

Cribbing, Concrete
Federal Cement Tile Co.
Massey Concrete Products Corp.

Crossing Gates
Kalamazoo Railway Supply Co.

Crossings, Highway
Barber Asphalt Co.
Carey Co., Philip
Headley Good Roads Co.

Crossings, Rail
Bethlehem Steel Co.
Interstate Car & Foundry Co.
Louisville Frog & Switch Co.
Ramapo Ajax Corp.
Wharton Jr. & Co., Wm.

Culvert Pipe
American Casting Co.
Armco Culvert & Flume Mfrs. Ass'n.
Central Alloy Steel Corp.
Massey Concrete Products Corp.

Curbing
Massey Concrete Products Corp.

Cypress, Red
Southern Cypress Mfrs. Ass'n.

Derails
Hayes Track Appliance Co.
Track Specialties Co.
Wharton Jr. & Co., Wm.

Derailing Switches
Ramapo Ajax Corp.

Derrick Cars
Maintenance Equipment Co.

Diesel Engines
Ingersoll-Rand Co.

Diesel Electric Power Plants
Ingersoll-Rand Co.

Discing Machines
Fairmont Railway Motors, Inc.

Ditchers
Jordan Co., O. F.

Doors
Richards-Wilcox Mfg. Co.

Drains, Perforated
Central Alloy Steel Corp.

Drills, Pneumatic
Ingersoll-Rand Co.

Drills, Rock
Ingersoll-Rand Co.
Sullivan Machinery Co.
Verona Tool Works

Drill Steel, Rock
Ingersoll-Rand Co.
Sullivan Machinery Co.

Drills, Track
Ingersoll-Rand Co.
Kalamazoo Railway Supply Co.
Railroad Accessories Corp.

Drinking Fountains
Taylor Co., Halsey W.

Dump Cars
Jordan Co., O. F.
Magor Car Corp.

Electric Cranes (Locomotive, Pillar, Transfer & Wrecking)
See Cranes

Electric Power Units
Northwestern Motor Co.
Syntron Co.

Electric Snow Melters
Lundie Engineering Corp.

Engines, Gasoline
Fairmont Railway Motors, Inc.
Ingersoll-Rand Co.
Kalamazoo Railway Supply Co.
Mudge & Co.
Northwestern Motor Co.
Woolery Machine Co.

Engines, Motor Car
Fairmont Railway Motor Co.
Kalamazoo Railway Supply Co.
Mudge & Co.
Northwestern Motor Co.
Woolery Machine Co.

Engines, Oil
Fairmont Railway Motors, Inc.
Ingersoll-Rand Co.

Fences
American Steel & Wire Co.
Anchor Post Fence Co.
Cyclone Fence Co.
Page Fence Association

Fence, Fabric
American Steel & Wire Co.
Anchor Post Fence Co.
Cyclone Fence Co.
Page Fence Association

Fence Posts
Anchor Post Fence Co.
Massey Concrete Products Corp
Page Fence Association

Flangeway Guards
Lebanon Steel Foundry

Floor Coverings
Barber Asphalt Co.
Lehon Co.

Foot Guards
Track Specialties Co.

Forgings
Bethlehem Steel Co.
Interstate Car & Foundry Co.

Frogs
Bethlehem Steel Co.
Interstate Car & Foundry Co.
Louisville Frog & Switch Co.
Ramapo Ajax Corp.
Track Specialties Co.
Wharton Jr. & Co., Inc., Wm.

Gages, Measuring
Lufkin Rule Co.

Gages, Pressure Gas
Oxweld Railroad Service Co.

Gas, Acetylene
Oxweld Railroad Service Co.

Gauge Rods
Edelblute Co., T. H.
Track Specialties Co.

Grinders, Portable
Ingersoll-Rand Co.

Guard Rails
American Chain Co., Inc.
Bethlehem Steel Co.
Carnegie Steel Co.
Louisville Frog & Switch Co.
Ramapo Ajax Corp
Wharton Jr. & Co., Wm.

Guard Rail Braces
Track Specialties Co.

Guard Rail Clamps
American Chain Co., Inc.
Bethlehem Steel Co.
Louisville Frog & Switch Co.
Ramapo Ajax Corp.
Track Specialties Co.
Wharton Jr. & Co., Wm.

Hammers, Chipping, Scaling and Calking
Ingersoll-Rand Co.

Hammer Drills
Ingersoll-Rand Co.
Sullivan Machinery Co.

Hammers, Forge
Sullivan Machinery Co.

Hammers, Riveting
Ingersoll-Rand Co.
Sullivan Machinery Co.

Hand Car Bearings
Timken Roller Bearing Co.

Head Drains, Perforated
Central Alloy Steel Corp.

Heel Blocks
Lebanon Steel Foundry

Highway Crossings
See Crossings, Highway

Hoisting Machinery
Industrial Brownhoist Corp.
Ingersoll-Rand Co.

Hoists, Air Motor
Ingersoll-Rand Co.

Hose
Ingersoll-Rand Co.

House Lining
Barber Asphalt Co.
Lehon Co.

Hydrants, Fire
Taylor Co., Halsey W.

Hydrants, Self-Closing
Taylor Co., Halsey W.

Ice Cutters
Jordan Co., O. F.

Inspection Cars
See Cars, Inspection

Inspection, Engineering
Hunt Co., Robert W.

Insulated Rail Joints
Bethlehem Steel Co.
Rail Joint Co.
Track Specialties Co.

Insulating Material
Barber Asphalt Co.
Lehon Co.

Jacks, Bridge
Kalamazoo Railway Supply Co.

Jacks, Track
Hackmann Railway Supply Co.
Kalamazoo Railway Supply Co.
Verona Tool Works

Joints, Compromise
American Chain Co., Inc.
Bethlehem Steel Co.
Rail Joint Co.
Track Specialties Co.

Joint Fastenings
Illinois Steel Co.

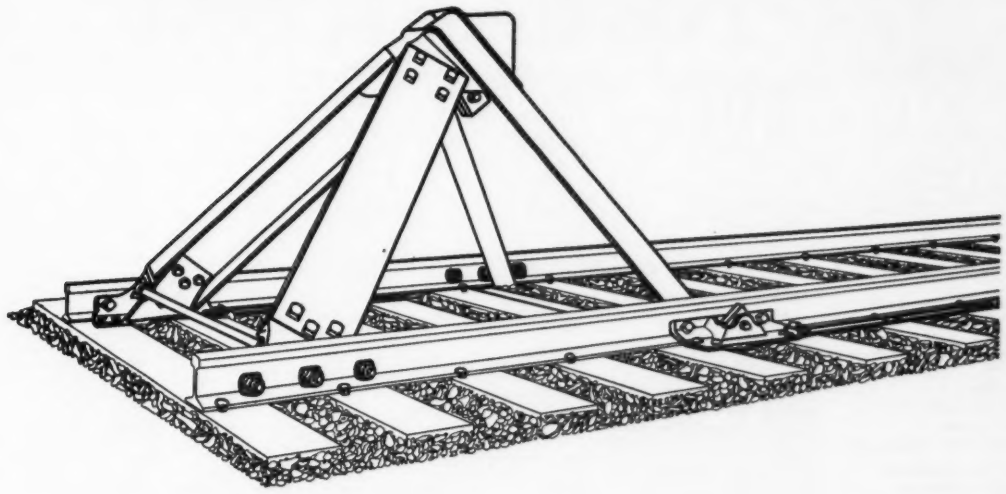
Joints, Rail
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Company
Rail Joint Co.
Track Specialties Co.
Wharton Jr. & Co., Wm.

Joints, Step
Illinois Steel Company
Rail Joint Co.
Track Specialties Co.

Junction Boxes
Massey Concrete Products Corp.

Liners, Track
Hackmann Railway Supply Co.
Rail Joint Co.
Track Specialties Co.

Lock Washers
National Lock Washer Co.
Reliance Manufacturing Co.
Track Specialties Co.



No Type W Post has ever been destroyed and scrapped.

This is the net result with over 1400 posts put in track during the past three years.

No more than 40% of its first cost has been spent in putting a damaged Type W Post back in service in good condition.

Size: Made in one size which fits any tee rail from 4 to 7 inches high with a base not wider than 6 inches. No special fittings are required for different weights and sections of rails. All Type W Posts are made exactly the same and will fit any of these rails.

Height: The center of striking face is standard coupler height.

Gage: Type W is made for standard gage track.

We also make posts for other heights and gages.

Materials: The head and tension joints are of A. R. A. specification coupler steel. The compression joints are of derail grade of malleable iron. The tension and compression members are of rolled steel. All other parts are steel.

Installation: This is explained on the green tag attached to each bundle. There are 12 holes for 1 inch bolts to drill in the track rails, three for each joint. These holes are 7 inch centers and the distance from one hole in a tension joint to a corresponding hole in the compression joint is 62 inches. The post is erected one piece at a time. Installation requires only two men.

Repair parts: Parts are designated by name and the size of the rail does not enter into the transaction. All the parts of a Type W Bumping Post can be bought separately for exactly the cost of the complete post.

Distinctive Features: The Type W Post is attached to the track rails and ties by the tension and compression joints. The shock is carried direct to eight cross ties and through them to the ballast. The post is so attached to the track structure that the rails, ties and ballast must all move before the post can be displaced.

All bolts are in simple shear only. None of these are subjected to any combination of shear and tension or bend.

The design affords elasticity to absorb the shock with minimum damage either to the post or to the equipment striking it. The post is not destroyed if knocked out. It can be restored to service for a minor fraction of its first cost.

Inspection before shipment: The parts are finished to templets and are interchangeable; each post is completely assembled in the factory and then taken down before shipment.

Packing: The Type W Post is shipped without boxing. It is prepared for shipment in eleven compact bundles. The shipping weight is 1230 lbs.

Shipping: All posts are manufactured in our own plant at Richmond, Indiana, by our own men employed exclusively on this work. A large stock of finished posts is kept on hand, painted, finally inspected and ready to mark for shipment. Posts are usually shipped the same day the orders reach us.

Hayes Track Appliance Co., Richmond, Indiana

BUYERS' GUIDE

Locomotives, Oil Engine Electric Driven
Ingersoll-Rand Co.

Lumber
Southern Cypress Mfrs. Ass'n.

Manganese Track Work
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wharton Jr. & Co., Wm.

Manholes
Massey Concrete Products Corp.

Markers
Massey Concrete Products Corp.

Mile Posts
Massey Concrete Products Corp.

Mono Cars
Track Specialties Co.

Motor Bearings
Timken Roller Bearing Co.

Motor Car Accessories
Mudge & Company

Motor Cars
See Cars, Motor

Mowing Machines
Fairmont Railway Motors, Inc.
Mudge & Co.

Nails, Tie Dating & Marking
Track Specialties Co.

Non-Derailer
Ramapo Ajax Corp.

Nut Locks
National Lock Washer Co.
Reliance Manufacturing Co.
Verona Tool Works
Woodings Forge & Tool Co.

Nuts
Bethlehem Steel Co.
Illinois Steel Co.
Interstate Car & Foundry Co.

Oil Engines
See Engines, Oil

Out Houses
Massey Concrete Products Corp.

Oxygen
Oxweld Railroad Service Co.

Oxy-Acetylene Welding Equipment
Oxweld Railroad Service Co.

Paint, Metal Protecting
Barber Asphalt Co.

Pavement Breakers
Ingersoll-Rand Co.
Sullivan Machinery Co.

Pile Drivers
Ingersoll-Rand Co.
Industrial Brownhoist Corp.

Piling
Carnegie Steel Co.
International Creosoting & Construction Co.
Jennison-Wright Co.
Massey Concrete Products Corp.
Prettyman & Sons, J. F.

Pipe, Cast Iron
American Casting Co.
Central Foundry Co.

Pipe Carriers
Massey Concrete Products Corp.

Pipe, Concrete
Massey Concrete Products Corp.

Pipe, Corrugated
Armco Culvert & Flume Mfrs. Ass'n

Pipe, Sewer
American Casting Co.
Central Foundry Co.
Massey Concrete Products Corp.

Plates, Miscellaneous
Ramapo Ajax Corp.
Track Specialties Co.

Platforms, Station
Headley Good Roads Co.

Poles
International Creosoting & Construction Co
Jennison-Wright Co.
Massey Concrete Products Corp.
Prettyman & Sons, J. F.

Posts, Fence
See Fence Posts

Posts, Bumping
See Bumping Posts

Power Plants, Portable
Northwestern Motor Co.
Syntron Co.

Preformed Track Pavement
Carey Co., Philip

Preservation, Timber
International Creosoting & Construction Co.
Jennison-Wright Co.
Prettyman & Sons, J. F.

Products, Gas
Oxweld Railroad Service Co.

Pumps, Air Pressure & Vacuum, Centrifugal, Deep Well, Piston, Plunger, Rotary, Slump
American Well Works
Ingersoll-Rand Co.
Layne & Bowler, Inc.
Rogers Iron Works, Inc.
Sullivan Machinery Co.
United Iron Works, Inc.

Push Cars
Fairmont Railway Motors, Inc.
Kalamazoo Railway Supply Co.
Mudge & Co.
Northwestern Motor Co.

Push Car Bearings
Timken Roller Bearing Co.

Rail Anchors
Bethlehem Steel Co
Coover Railroad Track Brace Co.
Lundie Engineering Corp.
P. & M. Co.
Track Specialties Co.
Verona Tool Works
Woodings Forge & Tool Co.

Rail Anti-Creepers
See Anti-Creepers, Rail

Rail Benders
American Chain Co., Inc.
Louisville Frog & Switch Co.
Track Specialties Co.
Verona Tool Works

Rail Bonds
Verona Tool Works

Rail Braces
Bethlehem Steel Co
Coover Railroad Track Brace Co.
Louisville Frog & Switch Co.
Ramapo Ajax Corp.
Track Specialties Co.
Wharton Jr., & Co., Wm

Rail Chair
Track Specialties Co.

Rail Clip
Track Specialties Co.

Rail Expanders
Ramapo Ajax Corp.

Rail Joints
See Joints, Rail

Rail Layers
Maintenance Equipment Co.

Rail Saws, Portable
Industrial Brownhoist Corp.
Kalamazoo Railway Supply Co.
Track Specialties Co.

Rail Springs
Verona Tool Works

Rails, Girder
Bethlehem Steel Co.

Rails, Tee
Bethlehem Steel Co.
Carnegie Steel Co.

Regulators, Oxy-Acetylene
Oxweld Railroad Service Co.

Removers, Paint and Varnish
Mudge & Co.

Replacers, Car & Locomotive
Edelblute Co., T. H.
Track Specialties Co.

Replacing Frogs
Edelblute Co., T. H.

Rerailers
Edelblute Co., T. H.

Retaining Walls, Precast
Federal Cement Tile Co.
Massey Concrete Product Corp.

Rivets
Bethlehem Steel Co.
Louisville Frog & Switch Co.

Rock Hammers
Ingersoll-Rand Company

Rods, Welding
Oxweld Railroad Service Co.

Roof Slabs
Federal Cement Tile Co.
Massey Concrete Products Corp.

Roofing, Cement & Concrete Tile
Federal Cement Tile Co.

Roofing Composition
Barber Asphalt Co.
Lehon Co.

Rules
Lufkin Rule Co.

Safety Flags
Louisville Frog & Switch Co.

Saw Mills
American Saw Mill Machy. Co.

Saw Rigs
American Saw Mill Machy. Co.

Saws, High Speed Friction
American Saw Mill Machy. Co.

Scales, Tape
Lufkin Rule Co.

Scoops
Ames Shovel & Tool Co.

Screw Spikes
Illinois Steel Company
Track Specialties Co.

Screw Spike Drivers
Ingersoll-Rand Co.

Screw Spike Wrench
Track Specialties Co.

Section Cars
See Cars, Section

Sharpeners, Rock Drill Steel
Ingersoll-Rand Co.

Sheathing Paper
Barber Asphalt Co.
Lehon Co.

Sheet Iron
Armco Culvert & Flume Mfrs. Ass'n.

Shims
Track Specialties Co.

Shingles, Composition
Barber Asphalt Co.
Lehon Co.

Shovels
Ames Shovel & Tool Co.
Interstate Car & Foundry Co.
Verona Tool Works
Woodings Forge & Tool Co.

Signal Foundations, Concrete
Massey Concrete Products Corp.

Skid Excavators & Dredges
Hayward Co.
Northwestern Engineering Co.

Slabs, Concrete
Massey Concrete Products Corp.

Smoke Stacks
Massey Concrete Products Corp.

Snow Fence
Track Specialties Co.

Snow Melting Device
Lundie Engineering Corp.

Snow Plows
Jordan Co., O. F.

Spades
Ames Shovel & Tool Co.

Spike Pullers
Louisville Frog & Switch Co., Inc.

Spikes
Bethlehem Steel Co
Illinois Steel Company
Track Specialties Co.

Spreader Cars
See Cars, Spreader

Spreaders, Ballast
See Ballast Spreaders

Stands, Switch & Target
Bethlehem Steel Co.
Ramapo Ajax Corp.

Steel, Alloy
Central Alloy Steel Corp.
Illinois Steel Company

Steel Cross Ties
Carnegie Steel Co.

Steel Plates and Shapes
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Company

Step Joints
See Joints, Step.

Structural Steel
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Company

Switch Guard
Ramapo Ajax Corp.

Switches
Bethlehem Steel Co.
Interstate Car & Foundry Co.
Ramapo Ajax Corp.
Track Specialties Co.
Wharton Jr. & Co., Wm.

Switch Brace
Track Specialties Co.

Switchmen's Houses
Massey Concrete Products Corp.

Switchpoint Protector
Maintenance Equipment Co.

Switchstands & Fixtures
Bethlehem Steel Co.
Ramapo Ajax Corp.
Track Specialties Co.
Wharton Jr. & Co., Wm.

Tampers, Tie
See Tie Tampers

Tapes, Measuring
Lufkin Rule Co.

Tee Rails
See Rails, Tee.

Telegraph Poles
See Poles

Testing of Materials
Hunt Co., Robert W.

Thawing Outfits
Lundie Engineering Corp.

Ties
International Creosoting & Construction Co.
Jennison-Wright Co.
Prettyman & Sons, J. F.

Tie Plates
Bethlehem Steel Co.
Illinois Steel Co.
Lundie Engineering Corp.
Sellers Manufacturing Co.
Track Specialties Co.

Tie Rods
Bethlehem Steel Co.
Track Specialties Co.

Tie Spacers
Maintenance Equipment Co.

Ties, Steel
Track Specialties Co.

Tie Tampers
Ingersoll-Rand Co.
Syntron Co.

Ties, Tongs
Track Specialties Co.

Tile, Roofing
Federal Cement Tile Co.

Timber
Southern Cypress Mfrs. Ass'n.

Timber, Bridge
Interstate Car & Foundry Co.

Timber, Creosoted
International Creosoting & Construction Co.
Jennison-Wright Co.
Prettyman & Sons, J. F.

Timber, Slab
Interstate Car & Foundry Co.

Track, Special Work
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.

Tools, Drainage
Ames Shovel & Tool Co.

Tools, Oxy-Acetylene Cutting & Welding
Oxweld Railroad Service Co.

Tools, Pneumatic
Ingersoll-Rand Co.

Tools, Track
Ames Shovel & Tool Co.
Buda Co.
Hackman Railway Supply Co.
Maintenance Equip. Co.
Track Specialties Co.
Verona Tool Works
Woodings Forge & Tool Co.

Tongue Switches
Bethlehem Steel Co.
Ramapo Ajax Corp.
Wharton Jr. Co., Wm.

Torches, Oxy-Acetylene Cutting & Welding
Oxweld Railroad Service Co.

Track Barrow
Track Specialties Co.

Track Braces
See Braces, Track

Track Drills
See Drills, Track

Track Gages
Buda Co.
Kalamazoo Railway Supply Co.
Track Specialties Co.

Track Jacks
See Jacks, Track

Track Levels
Kalamazoo Railway Supply Co.
Track Specialties Co.

Track Liners
See Liners, Track

Track Tools
See Tools, Track

Trestle Slabs
Massey Concrete Products Corp.

Trucks, Hand, Steel
Anchor Post Fence Co.

Water Supply Contractors
Layne & Bowler, Inc.

Waterproofing Fabrics
Barber Asphalt Co.
Lehon Co.

Weed Burner
Fairmont Railway Motors, Inc.
Woolery Machine Co.

Welding & Cutting Equipment
Oxweld Railroad Service Co.

Welding, Oxy-Acetylene
Oxweld Railroad Service Co.

Well Systems
Layne & Bowler, Inc.

Wheels, Hand & Motor Car
Fairmont Railway Motors, Inc.
Kalamazoo Railway Supply Co.
Mudge & Co.
Northwestern Motor Co.
Woolery Machine Co.

Wheels, Wrought Steel
Carnegie Steel Co.

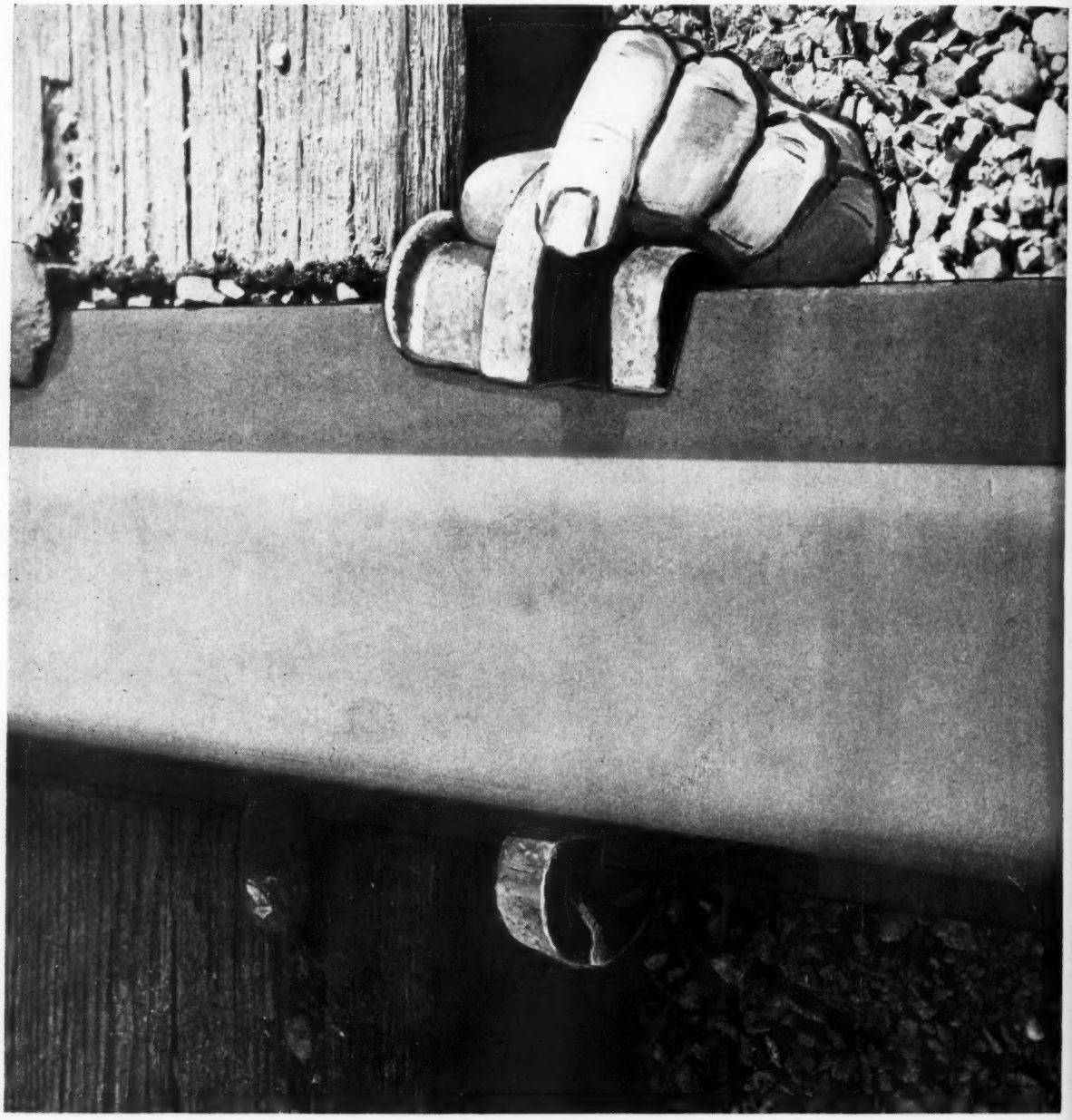
Windshields
Mudge & Co.

Wire Fencing
American Steel & Wire Co.
Anchor Post Fence Co.
Cyclone Fence Co.
Page Fence Association

Wood Preservation
See Preservation, Timber

Wood Working Machinery
American Saw Mill Machy. Co.

ALPHABETICAL INDEX TO ADVERTISERS



The clutching hand of frozen ballast

Many rail anchors operate perfectly in the warm, summer months; but when the winter comes, they fail. The clutching hand of frozen ballast snatches at them, drives out some essential piece of the mechanism, or otherwise loosens their grip upon the rail.

The Ericson Rail Anchor works just as well in winter as in summer. Four years of service on the railroads in Canada proves their unfailing ability to defy frost.

But don't take our word for it. Apply some Ericson anchors to your rails this month. To the same rails apply other anchors. Then judge by the results.

VERONA TOOL WORKS

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